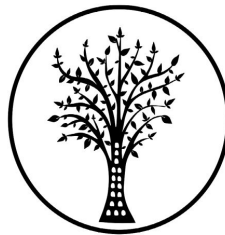


HERITAGE IMPACT ASSESSMENT

In terms of Section 38(8) of the NHRA for a
Proposed development of a 132kV powerline near Olifantshoek,
Northern Cape

Prepared by



CTS HERITAGE

In Association with

Savannah Environmental Services

February 2020



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THE INDEPENDENT PERSON WHO COMPILED A SPECIALIST REPORT OR UNDERTOOK A SPECIALIST PROCESS

I, Jenna Lavin, as the appointed independent specialist hereby declare that I:

- act/ed as the independent specialist in this application;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- have and will not have no vested interest in the proposed activity proceeding;
- have disclosed, to the applicant, EAP and competent authority, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations, 2010 (specifically in terms of regulation 17 of GN No. R. 543) and any specific environmental management Act, and that failure to comply with these requirements may constitute and result in disqualification;
- have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
- have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
- have ensured that the names of all interested and affected parties that participated in terms of the specialist input/study were recorded in the register of interested and affected parties who participated in the public participation process;
- have provided the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not; and
- am aware that a false declaration is an offence in terms of regulation 71 of GN No. R. 543.

Jenna Lavin

Signature of the specialist

CTS Heritage

Name of company

February 2020

Date



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EXECUTIVE SUMMARY

The Gamagara Local Municipality proposes the construction and operation of a grid connection infrastructure between the existing Elim Substation and the authorised Olifantshoek Substation near the town of Olifantshoek in the Northern Cape Province. The grid infrastructure will be used to strengthen the grid network in the area in order to ensure an adequate supply of electricity for the residents within the Municipality's jurisdictional area.

This application is for the proposed establishment of a 132kV powerline from the Olifantshoek Substation to the Elim Substation located 13 km west of Kathu. The town of Kathu was established in the 1960's and 1970's as a result of the iron ore mining taking place at the neighbouring Sishen mine. It is important to note that the northern portion of the development lies in close proximity to the Grade I Kathu Pan Archaeological site. At Kathu Pan, north west of the town, evidence of early hominin occupation has been observed at multiple sinkhole sites within the pan, and the results of scientific investigation into these sites has been broadly published. These sites are known for its rich collection of Early Stone Age artefacts, and several Archaeological and Heritage Impact Assessments have recorded the area (see Figure 4 Appendix 3). These archaeological resources occur in areas associated with outcrops of banded ironstone, and the localised natural pan, with most coming specifically from sinkholes in the pan itself. Based on the geology and fossil record, a field scoping study is recommended in the Kalahari Group deposits, specifically the surface limestones, before excavation takes place in order to confirm the absence of Kathu Pan-like deposits that may contain Pleistocene fossil faunal assemblages.

However, the archaeological field assessment did not identify any archaeological resources of significance within the proposed alignment. Two sets of unmarked graves were identified within the proposed alignment, and these may not be impacted by the proposed development. It is recommended that a 50m no-go buffer is established around sites NLN002 and MRR002.

For the remainder of the power line, there is very little chance of significant fossil finds being made. Any fossil finds (in stromatolitic Mooidraai and Lucknow formations) are to be reported by the developer. Should important fossil material be found during excavations, the attached Fossil Finds Procedure must be implemented (Appendix 2).

As such, there is no objection to the proposed development on condition that:

- A 50m no-go buffer is established around sites NLN002 and MRR002, and these sites are clearly marked as no-go areas on all development maps.
- Surface limestones of the Mokalanen Formation are inspected before excavation takes place in order to confirm the absence of Kathu Pan-like deposits that may contain Pleistocene fossil faunal assemblages.
- Should any human remains or evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources be impacted during the proposed development, work must cease and SAHRA APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) must be alerted to determine a way forward.



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Details of Specialist who prepared the HIA

Jenna Lavin, an archaeologist with an MSc in Archaeology and Palaeoenvironments, and currently completing an MPhil in Conservation Management, heads up the heritage division of the organisation, and has a wealth of experience in the heritage management sector. Jenna's previous position as the Assistant Director for Policy, Research and Planning at Heritage Western Cape has provided her with an in-depth understanding of national and international heritage legislation. Her 8 years of experience at various heritage authorities in South Africa means that she has dealt extensively with permitting, policy formulation, compliance and heritage management at national and provincial level and has also been heavily involved in rolling out training on SAHRIS to the Provincial Heritage Resources Authorities and local authorities.

Jenna is on the Executive Committee of the Association of Professional Heritage Practitioners (APHP), and is also an active member of the International Committee on Monuments and Sites (ICOMOS) as well as the International Committee on Archaeological Heritage Management (ICAHM). In addition, Jenna has been a member of the Association of Southern African Professional Archaeologists (ASAPA) since 2009. Recently, Jenna has been responsible for conducting training in how to write Wikipedia articles for the Africa Centre's WikiAfrica project.

Since 2016, Jenna has drafted over 50 Heritage Impact Assessments throughout South Africa.



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1. INTRODUCTION

1.1 Background Information on Project

The Gamagara Local Municipality proposes the construction and operation of a grid connection infrastructure between the existing Elim Substation and the authorised Olifantshoek Substation near the town of Olifantshoek in the Northern Cape Province. The grid infrastructure will be used to strengthen the grid network in the area in order to ensure an adequate supply of electricity for the residents within the Municipality's jurisdictional area.

The grid connection infrastructure will only include a single circuit power line with capacity of up to 132kV and a two-way and 4m wide haul road within the corridor for the duration of the construction phase only. The power line is being assessed within a 300m wide and 36km long corridor which will allow for the optimisation of the infrastructure to be developed and to avoid identified environmental sensitivities. The height of the power line pylons will be up to 20m. The servitude of the power line will be 31m in width.

The grid connection corridor traverses the following affected properties, namely:

- » Remaining Extent of the Farm Fritz 540
- » Portion 1 of the Farm Fritz 540
- » Portion 2 of the Farm Fritz 540
- » Portion 4 of the Farm Fritz 540
- » Portion 5 of the Farm Fritz 540
- » Portion 8 of the Farm Fritz 540
- » Portion 9 of the Farm Fritz 540
- » Portion 10 of the Farm Fritz 540
- » Remaining Extent of the Farm Gamagara 541
- » Portion 1 of the Farm Gamagara 541
- » Portion 7 of the Farm Gamagara 541
- » Portion 2 of the Farm Dingle 565
- » Remaining Extent of the Farm Dingle 565
- » Remaining Extent of the Farm Smythe 566
- » Remaining Extent of the Farm Murray 570
- » Portion 2 of the Farm Murray 570
- » Remaining Extent of the Farm Cox 571
- » Portion 1 of the Farm Cox 571
- » Portion 3 of the Farm Cox 571
- » Portion 4 of the Farm Cox 571
- » Remaining Extent of the Farm Hartley 573
- » Remaining Extent of the Farm Diegaart's Heuwel 765
- » Portion 1 of the Farm Neylan 574
- » Portion 3 of the Farm Neylan 766



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- » Portion 7 of the Farm Neylan 766
- » Portion 2 of the Farm Neylan 766
- » Portion 4 of the Farm Neylan 766
- » Portion 3 of the Farm Hartley 573
- » Remaining Extent of the Farm Neylan 766
- » Remaining Extent of Erven 155

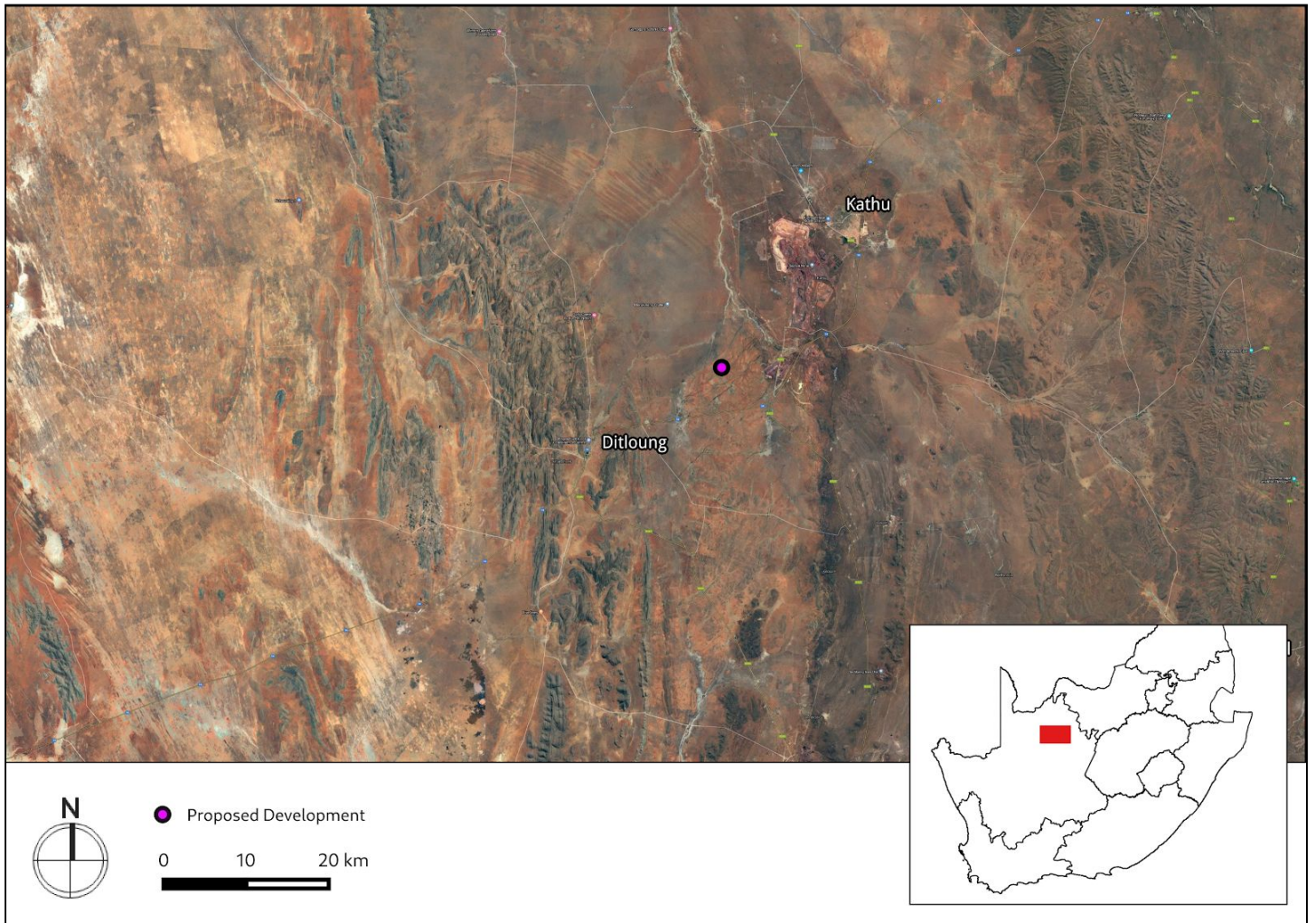


Figure 1.1: Google Earth© satellite image of the proposed development area



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1.2 Description of Property and Affected Environment

The landscape of the study area is typical Olifantshoek Plains Thornveld and Kathu Bushveld (Mucina & Rutherford 2006). It ranges from wide plains with open trees and shrub layers and sparse grass layers, to medium-tall tree layers, with extensive shrub and variable grass cover. Flat red aeolian sand plains with minor dunes interspersed with gravel pavements constitute the majority of the terrain. Vegetation noted across the development footprint include Camel Thorn trees (*Acacia erioloba*), Black Thorn trees (*Acacia mellifera*), Three Thorn/Driedoring (*Rhigozum trichotomum*), Skaapbossie (*Aizoon schellenbergii*), Shepherd tree (*Boscia albitrunca*), Suurgras (*Enneapogon desvauxii*), Tall Bushman grass (*Stipagrostis hirtigluma*), Silky Bushman grass (*Stipagrostis uniplumis*), Kortbeen Boesmangras (*Stipagrostis obtuse*), Pencil milk bush (*Euphorbia lignose*) and Hereroland aloe (*Aloe hereroensis*). The Langeberg mountain range is visible towards the western horizon. Several dry riverine beds are present on the site flowing from north to south and from west to east, but no perennial rivers or riverine were crossed.

The development footprint is bounded in the north by mine activities (Khumani/Sishen/Dingleton) mines and the existing Elim Eskom substation, and in the south by the N14 National road and open farmland. The Olifantshoek townscape and Langeberg mountain range frame the development in the west, while the N14 National road and mining activities bound the development in the east. Anthropogenic disturbances occur predominantly along existing roads within the development footprint, at the new substation location at Olifantshoek, and near Elim substation, where some trenches traverse the footprint.



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Figure 1.2: Close up satellite image indicating proposed location of development

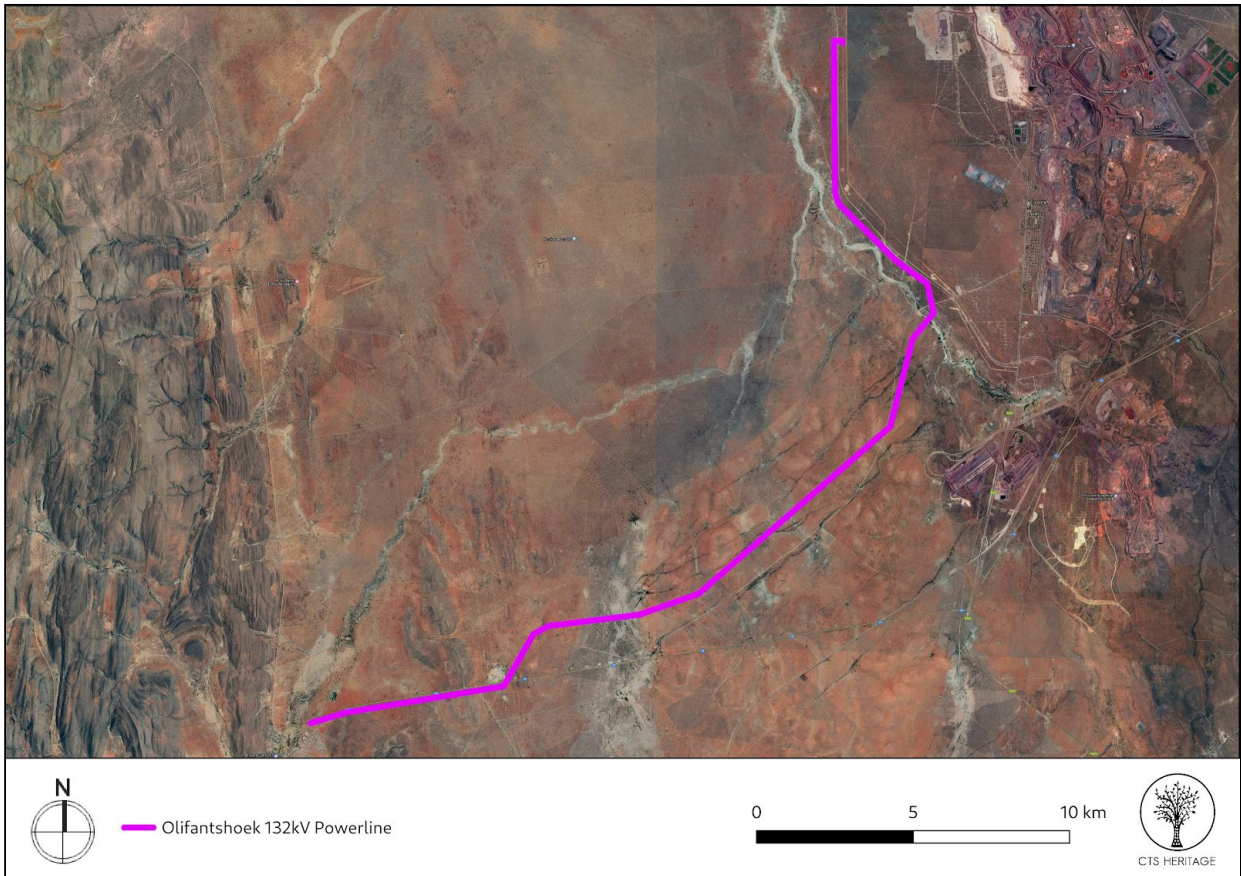


Figure 1.3: Close up satellite image indicating proposed location of development



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2. METHODOLOGY

2.1 Purpose of HIA

The purpose of this Heritage Impact Assessment (HIA) is to satisfy the requirements of section 38(8), and therefore section 38(3) of the National Heritage Resources Act (Act 25 of 1999).

2.2 Summary of steps followed

- An archaeologist conducted a survey of the site and its environs on 6, 7 and 8 February 2020 to determine what archaeological resources are likely to be impacted by the proposed development.
- A Desktop Palaeontological Assessment was completed
- The identified resources were assessed to evaluate their heritage significance in terms of the grading system outlined in section 3 of the NHRA (Act 25 of 1999).
- Alternatives and mitigation options were discussed with the Environmental Assessment Practitioner.

2.3 Constraints and Limitations

The archaeological field assessment was constrained by access restrictions to some of the farms along the proposed alignment. The EAP was informed of the times of the site visit and endeavoured to inform all relevant landowners of the site visit. Furthermore, contact details were provided for relevant landowners however these proved unhelpful in some instances, as several farmers do not reside on the affected properties. Some farmers were not available on their mobile phones due to bad cell service or were busy and unable to assist, while others were unwilling to provide access due to general negativity towards the development on their farms. All effort has been made to cover as much ground as possible in the circumstances (see the Track Paths map below).

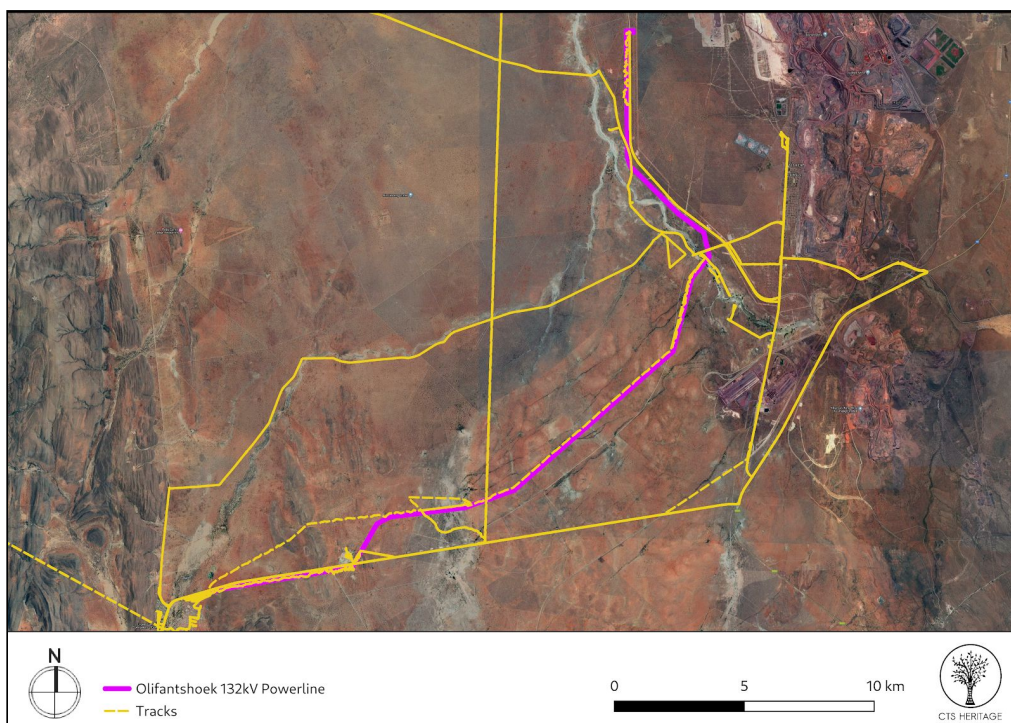


Figure 2. Map of track paths relative to the proposed development



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3. HISTORY AND EVOLUTION OF THE SITE AND CONTEXT

3.1 Historical Background of the Area

This application is for the proposed establishment of a 132kV powerline from the Olifantshoek Substation to the Elim Substation located 13 km west of Kathu. The town of Kathu was established in the 1960's and 1970's as a result of the iron ore mining taking place at the neighbouring Sishen mine. It is important to note that the northern portion of the development lies in close proximity to the Grade I Kathu Pan Archaeological site. At Kathu Pan, north west of the town, evidence of early hominin occupation has been observed at multiple sinkhole sites within the pan, and the results of scientific investigation into these sites has been broadly published. These sites are known for its rich collection of Early Stone Age artefacts, and several Archaeological and Heritage Impact Assessments have recorded the area (see Figure 4 Appendix 3). These archaeological resources occur in areas associated with outcrops of banded ironstone, and the localised natural pan, with most coming specifically from sinkholes in the pan itself.

3.2 Previous Impact Assessments Conducted

Gaigher (2014) conducted an assessment for the Solar-Ferrum 400kV Power Line (NID 161472) which runs through part of the proposed 132kV alignment. His report concluded that only ephemeral scatters of Stone Age artefacts of low significance were located in the vicinity of the power line, and he recorded no rock engravings or built environment sites - common site types to be found in this region. The only burial grounds site that Gaigher mentions is the Olifantshoek Cemetery (Site ID 95604), which lies roughly 500m to the west of the southern-most tip of the power line (see Figure 3d), but which will not be impacted. Beaumont's (2007) HIA located a burial ground (Site ID 44581) that he concluded to be from the early 1950's or late 1940's. He located some ephemeral stone age artefacts of low significance which he did not record, but found no archaeological or palaeontological sites of value. In his assessment, Kruger (2012, NID 108970) noted that "a few Middle Stone Age (MSA) artefacts, generally made from fine grained specularite and jaspilite, were recorded at three locations around small water pans in the area. These lithics include only rough core and flake artefacts with smoothed surfaces, and no formal stone tools were observed. However, larger amounts of Earlier and Middle Stone Age artefacts including handaxes, cores and flakes were noted."

According to the SAHRA Palaeosensitivity map, the area is underlain by formations of moderate, high and unknown palaeontological significance. However Almond and Pether (2009) describe these specific formations as having a low sensitivity for fossils: both the Hartley and the Lucknow Formations have a low fossil sensitivity, and the sensitivity of the Volwater Formation is unknown. The Gordonia Formation of the Kalahari Group consists of aeolian sands and fossils (bones, teeth, petrified wood, palynomorphs) mainly associated with ancient pans, lakes and river systems, however in a Palaeontological Impact Assessment by Almond (2012, NID 114648), it is stated that "*while a wide spectrum of vertebrate remains, invertebrates, trace fossils, plant fossils and microfossils have been recorded from these Kalahari Group sediments, in general they are of low palaeontological sensitivity and of considerable lateral extent so impacts on fossil heritage here are likely to be of low significance*". Considering these factors, and the fact that no deep excavation is anticipated to occur, it is unlikely that palaeontologically sensitive sediments will be impacted by the proposed development.



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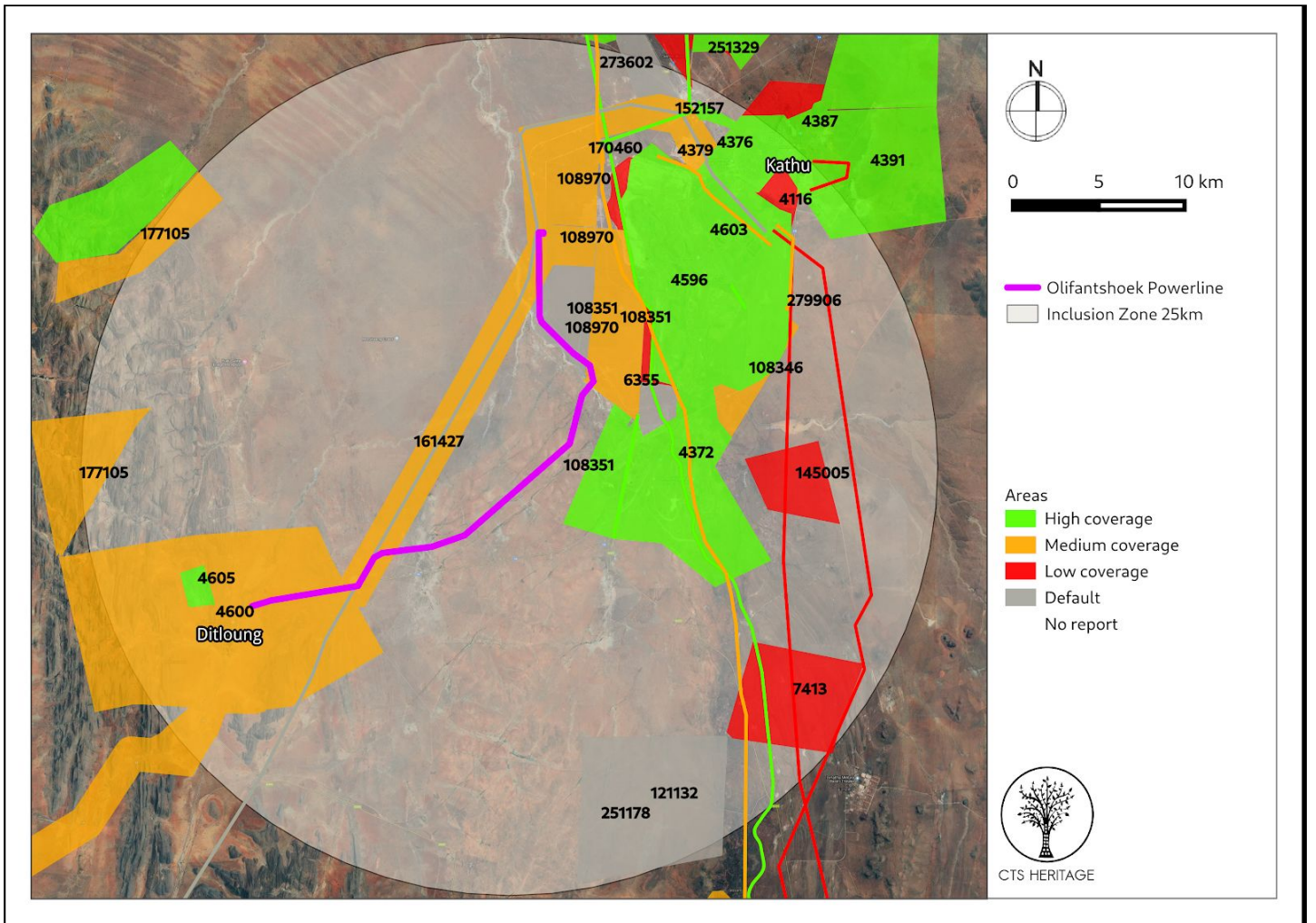


Figure 3: Close up satellite image indicating proposed location of development in relation to heritage studies previously conducted



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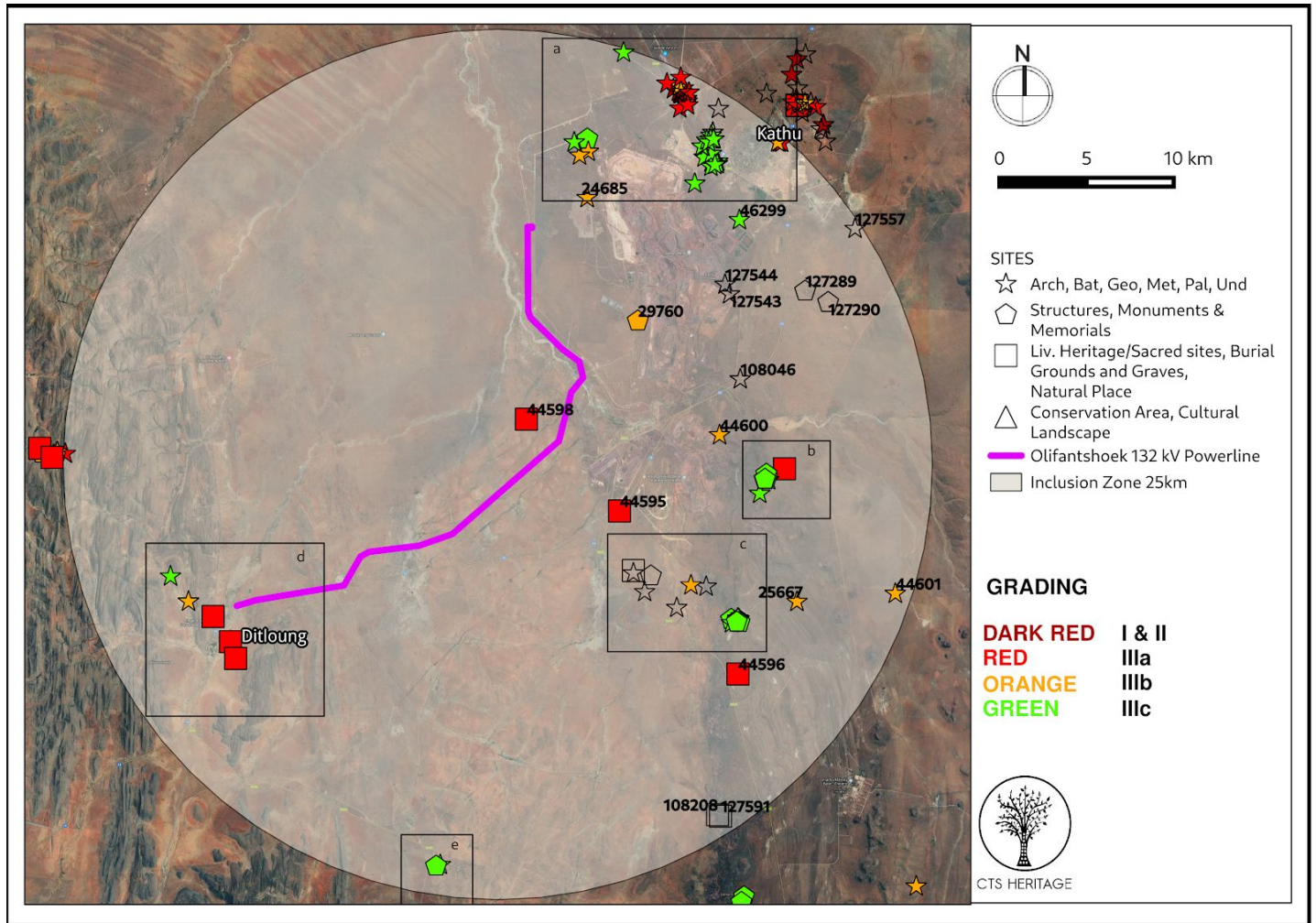


Figure 4. Heritage Resources Map. Heritage Resources previously identified in and near the study area, with SAHRIS Site IDs indicated (see attached screening assessment for insets)

4. IDENTIFICATION OF HERITAGE RESOURCES

4.1 Summary of specialist findings

Archaeology

Surprisingly, Stone age material was very scarce along the alignment, and no artefacts were recorded except for one LSA bladelet/trimmed flake (DNG001). Higher concentrations of Stone Age (predominantly ESA/MSA) material are located at Kathu Pan and surrounding areas. The presence of subsurface Stone Age material is always possible, but during the survey, no stone stone artefacts were identified.

An interesting Historical occupation site was identified on Murray farm (MRR001). The cultural material associated with this site can be relatively dated to 1890, 1910 and later. There is a possibility that this site has had multiple occupations and that it had served as a livestock post/overnight camp for farmers moving stock between farms or regions. It might even have served as a source of water during the South African War. The site has however been disturbed in the recent past.



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Four official municipal cemeteries were recorded as well as two unmarked graves at Olifantshoek close to the proposed Olifantshoek substation. Another two unmarked graves were identified on Murray farm in close proximity to the historical site noted above (MRR002). All of the burials identified are located far enough from the proposed alignment that impact is very unlikely.

Palaeontology

The proposed powerline is mainly underlain by the Kalahari Group sands and calcretes as well as the Ongeluk Formation volcanic rocks. The powerline does however also traverse small exposures of Voëlwater Formation, Lucknow Formation and Hartley Formation volcanic rocks.

Based on the geology of the proposed development area as well as the current palaeontological record, it is anticipated that the impact of the development will mainly be LOW to MODERATE. However, the north-east section of the power line traversing the Kalahari Group deposits may have HIGH impact due to the close proximity of the Kathu Pan deposits.

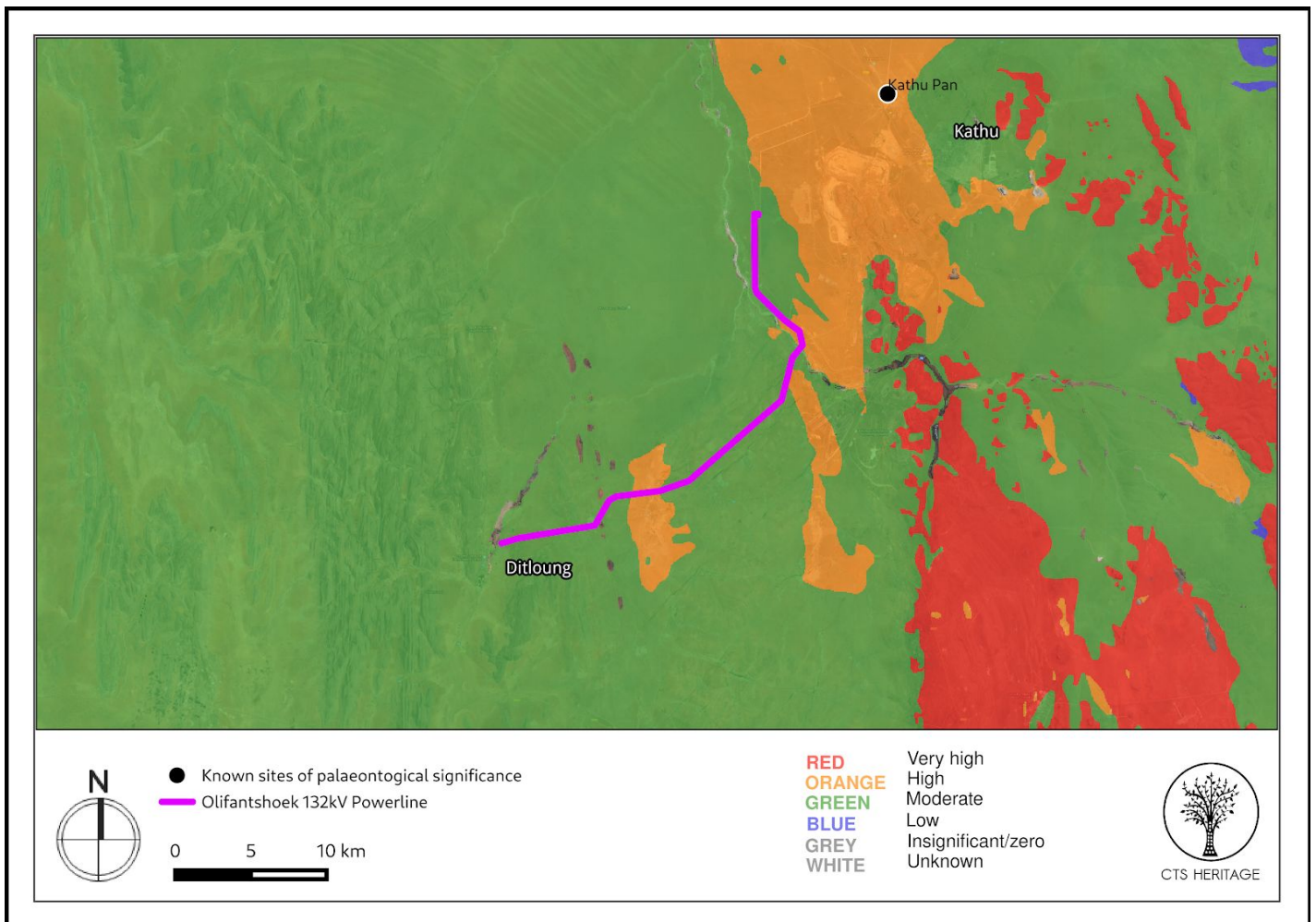


Figure 5: Palaeosensitivity Map. Indicating Unknown to Moderate to High fossil sensitivity underlying the study area.



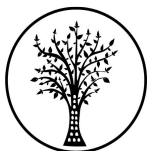
4.2 Heritage Resources identified

Archaeology

Only five incidences of heritage resources were documented along the 36km development corridor. NLN001 and NLN002 are situated on the Farm Neylan No. 574 Portion 1 in the vicinity of the proposed location of the new to-be-constructed substation at Olifantshoek, MRR001 and MRR002, are located to the east on the farm Murray No. 570 Portion 2, and DNG001 is situated towards the north-east on the Remainder of the farm Dingle No. 565.

Table 1: Archaeological and heritage resources identified along the alignment. Sites falling within the proposed footprint are highlighted in purple. Please see the full AIA in Appendix 1 for more detailed information. Sites mapped in Figure 6 below

Point ID	Site No.	Site Name	Description	Grading	Mitigation
002	NLN002	Neylan No. 574/1-002	Two unmarked graves in the vicinity of a proposed new substation at Olifantshoek	Grade IIIA	The site should be included in the heritage register and may not be impacted. A 50m no-go buffer area must be established.
003	NLN001	Neylan No. 574/1-002	Collapsed stone wall orientation east to west. Approximately 100m in length. Possible fencing wall, linear without any angles or kraal shaped.	NCW	Phase 1 is seen as sufficient recording, and it may be demolished
006	OFH006	Welgelee cemetery	Welgelee informal settlement official municipal cemetery	Grade IIIA	The site should be included in the heritage register and may not be impacted
007	OFH007	Ditlounge cemetery	Ditlounge informal settlement official municipal cemetery	Grade IIIA	The site should be included in the heritage register and may not be impacted
008	OFH008	Diepkloof cemetery	Diepkloof informal settlement official municipal cemetery	Grade IIIA	The site should be included in the heritage register and may not be impacted
009	OFH009	Olifantshoek cemetery	Olifantshoek town official municipal cemetery	Grade IIIA	The site should be included in the heritage register and may not be impacted
017	MRR001	Murray No. 570/2-001	Colonial/historical settlement ca. 1910-1950. Next to a natural water source, currently dry. Evidence of stone walls, crib, possible kraal, old Fig tree (<i>Ficus carica</i>) and material culture such as glass, ceramics and metal objects. Multiple occupations are evident. Disturbed by natural erosion.	Grade IIIC	Phase 1 is seen as sufficient recording, and it may be demolished, low heritage significance
019	DNG001	Dingle No. 565/RE/001	Isolated LSA CCS bladelet. N=1 in 100m ² .	NCW	Phase 1 is seen as sufficient recording, and it may be demolished
020	MRR002	Murray No. 570/2-002	Two unmarked graves on "Murray" farm. Possibly older than 100 years. Soldered tin and ammunition rest found in superficial association with the burials.	Grade IIIA	The site should be included in the heritage register and may not be impacted. A 50m no-go buffer area must be established.



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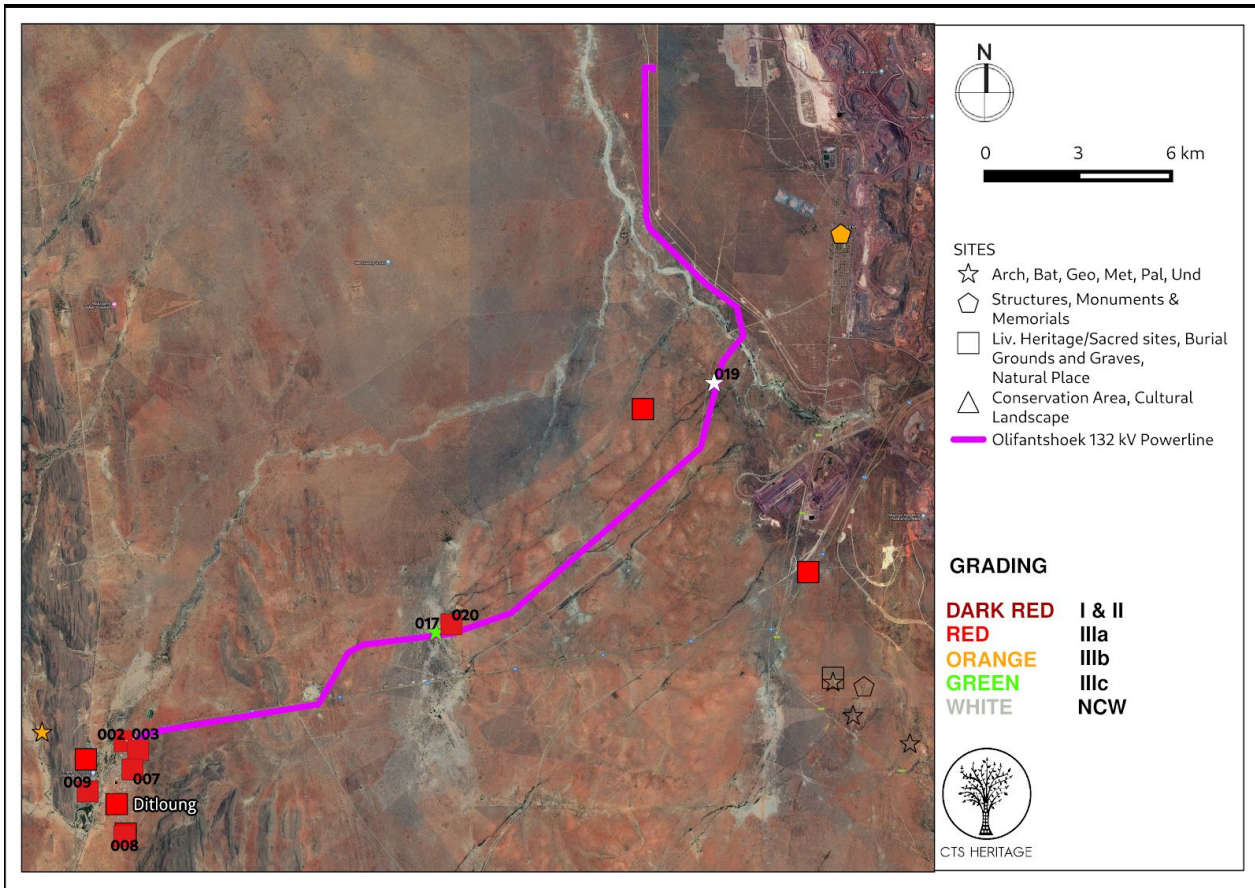


Figure 6: Sites identified during the field assessment - insets below

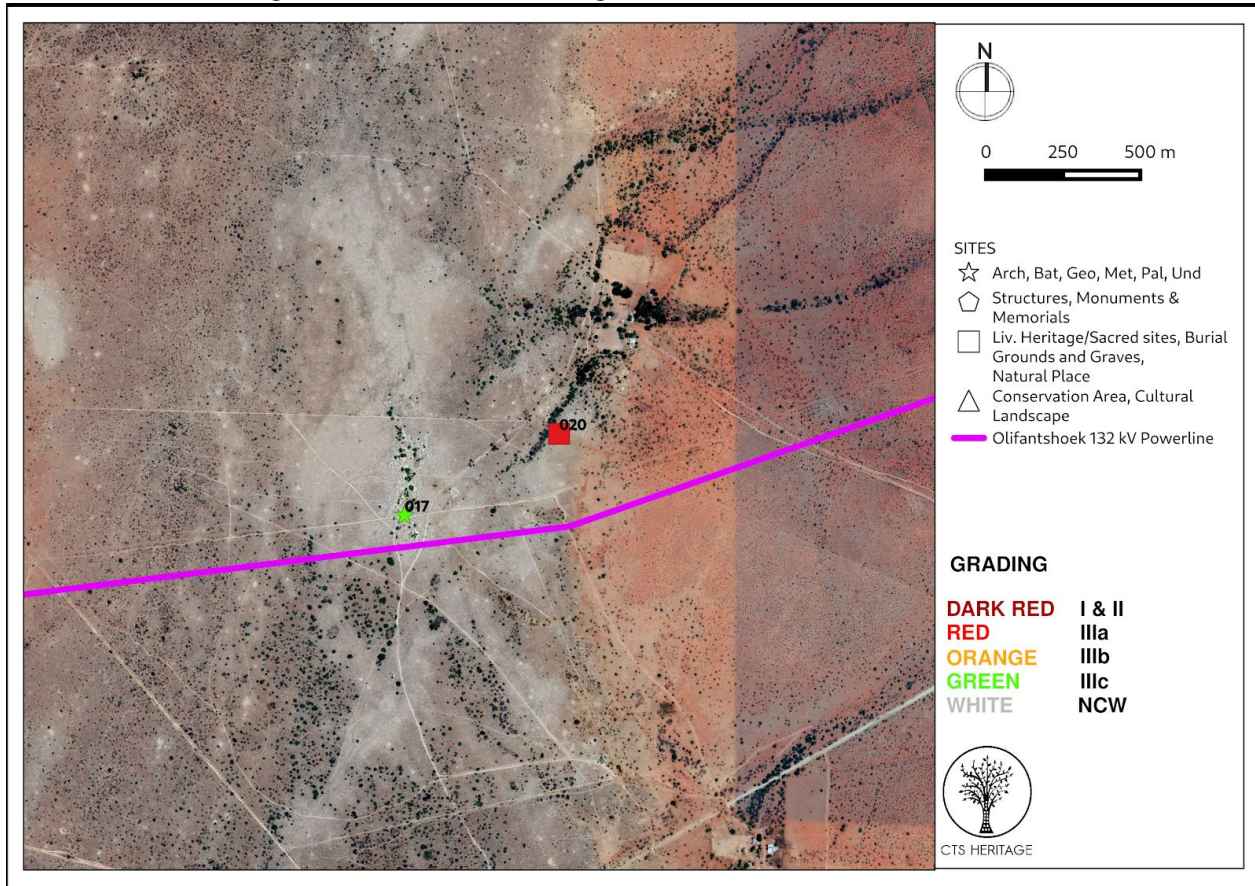


Figure 6.1: Sites identified during the field assessment on Murray Farm



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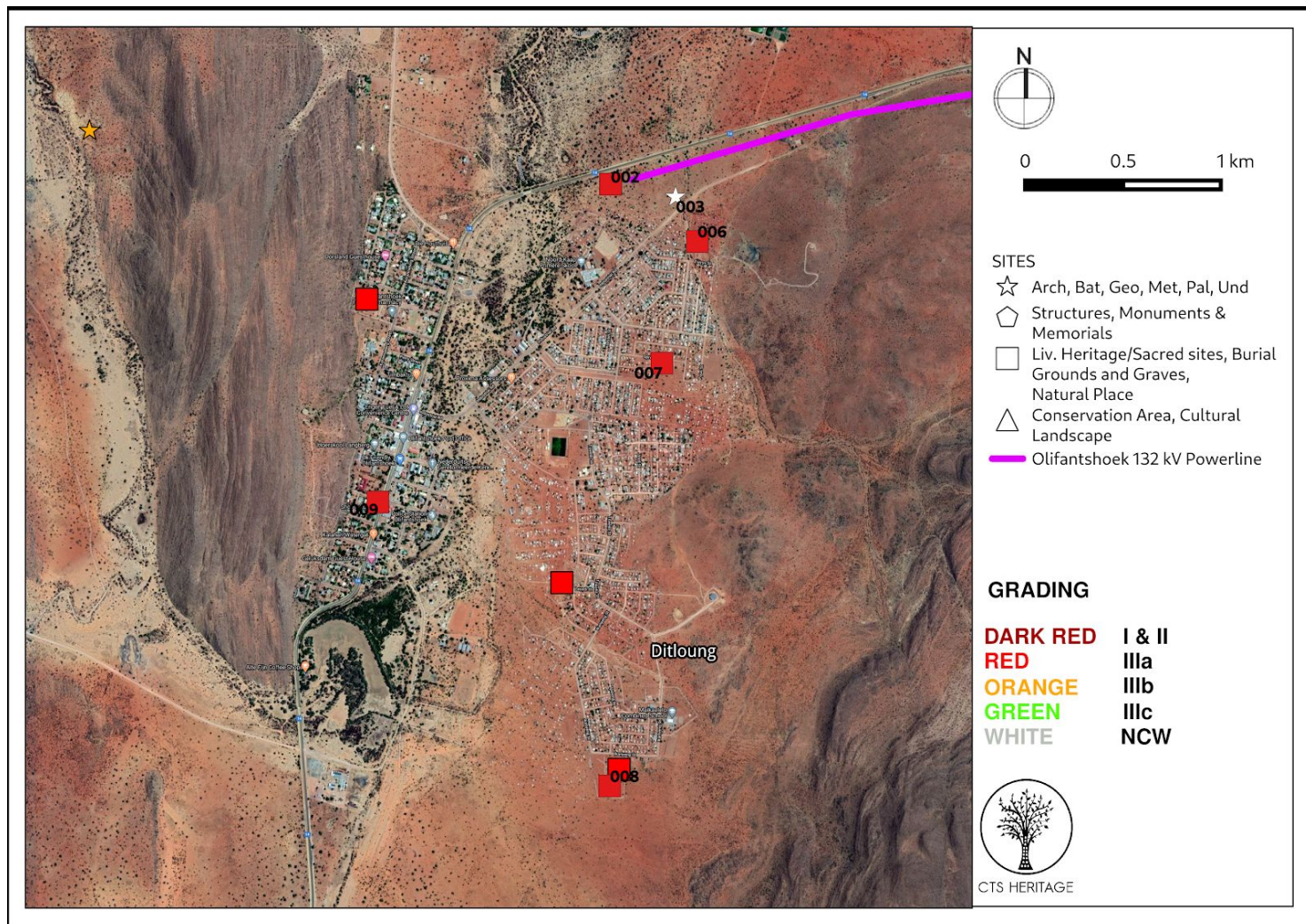


Figure 6.1: Sites identified during the field assessment on Murray Farm

Palaeontology

The proposed powerline is mainly underlain by the Kalahari Group sands and calcretes as well as the Ongeluk Formation volcanic rocks. The powerline does however also traverse small exposures of Voëlwater Formation, Lucknow Formation and Hartley Formation volcanic rocks.

Table 1: Geology and fossil heritage of the proposed Olifantshoek Powerline area, Northern Cape. Palaeontological sensitivity (Almond and Pether (2008) indicated by colour: Red - Very High, Orange - High, Green - Moderate, Blue - Low, Grey - Insignificant, Clear - Unknown)

Geological Unit	Age	Lithology	Symbol Fig. 7	Fossil Heritage	Mitigation
Kalahari Group, Wind-blown sand (Gordonia Formation)	2.6 mya to 0 mya	Informally kalahari sand, red (haematite coated) and white (lacking haematite) aeolian sand, usually deposited on underlying calcrete surface but can rest directly on pre kalahari deposits. 30m thick	Qs	Calcretised insect burrows (including termites) and root casts (rhizoliths), ostrich egg shells (Struthio), shells of land snails (e.g. Trigonephrus), bivalves and gastropods (e.g. Corbula, unio) and ostracods (seed shrimps), charophytes (stonewort algae), diatoms,	No action required (any fossil finds to be reported by developer)



				Stromatolites, mammalian ichnofossils	
Kalahari Group, Surface limestone (Mokalanen Formation)	5.3 mya to 0 mya	Sandy limestones and Overlying conglomerates with a calcareous matrix. 30m Possibility of dolines infilled with Pleistocene and Holocene deposits	Tl	Calcretised burrows (including termites), root casts (rhizoliths) as well as Mammalian Ichnofossils. Possible fragmented, mainly dental remains of Pleistocene mammals (including equids, rhinoceros, zebra and bovines).	Field scoping study recommended before excavation takes place
Olifantshoek Supergroup, Hartley Formation	1.9 ga	Basaltic lava, tuffs with Interbedded lenses of Quartzite, conglomerate as well as rare quartz porphyry. 300 to 762m thick	Vh	None	No action required (any fossil finds to be reported by developer)
Olifantshoek Supergroup, Lucknow Formation	Between 2.2 ga and 2.1 ga	Shales (deposited in open marine environment), micritic and stromatolitic Dolostones (deposited in a shallow protected carbonate lagoon environment), wackes (deposited in possibly tidal sand and mud flats), quartz arenites (deposited in fluvio-marine channels) and dolarenites and Dolorudites (deposited in Fluvio-marine channels). 500m thick	VI	Nodular and laminated domal and columnar stromatolites	No action required (any fossil finds to be reported by developer)
Transvaal Supergroup, Postmasburg Group, Voëlwater Subgroup, Moidraai Formation	2.4 ga	Dolomites	Vv	Smoothly laminated stromatolites	No action required (any fossil finds to be reported by developer)
Transvaal Supergroup, Postmasburg Group, Voëlwater Subgroup, Hotazel Formation	Paleo-proterozoic	Jaspillites and volcanic-Exhalative manganese deposits. 200-250m thick	Vv	None	No action required (any fossil finds to be reported by developer)
Transvaal Supergroup, Postmasburg Group, Voëlwater Subgroup, Ongeluk Formation	Between 2.2 ga and 2.43 ga	Extrusive tholeiitic basaltic-andesitic lavas that formed as part of a larger flood-basalt volcanic event. Depositional environment is believed to vary from subaqueous (pillow lavas, Hyaloclastites and massive flows) to subaerial (pipe amygdaloids and flow structures). 500-600m thick	Vo	2.4 billion year old microscopic (2-12µm wide) Fungus-like mycelial fossils	No action required (any fossil finds to be reported by developer)



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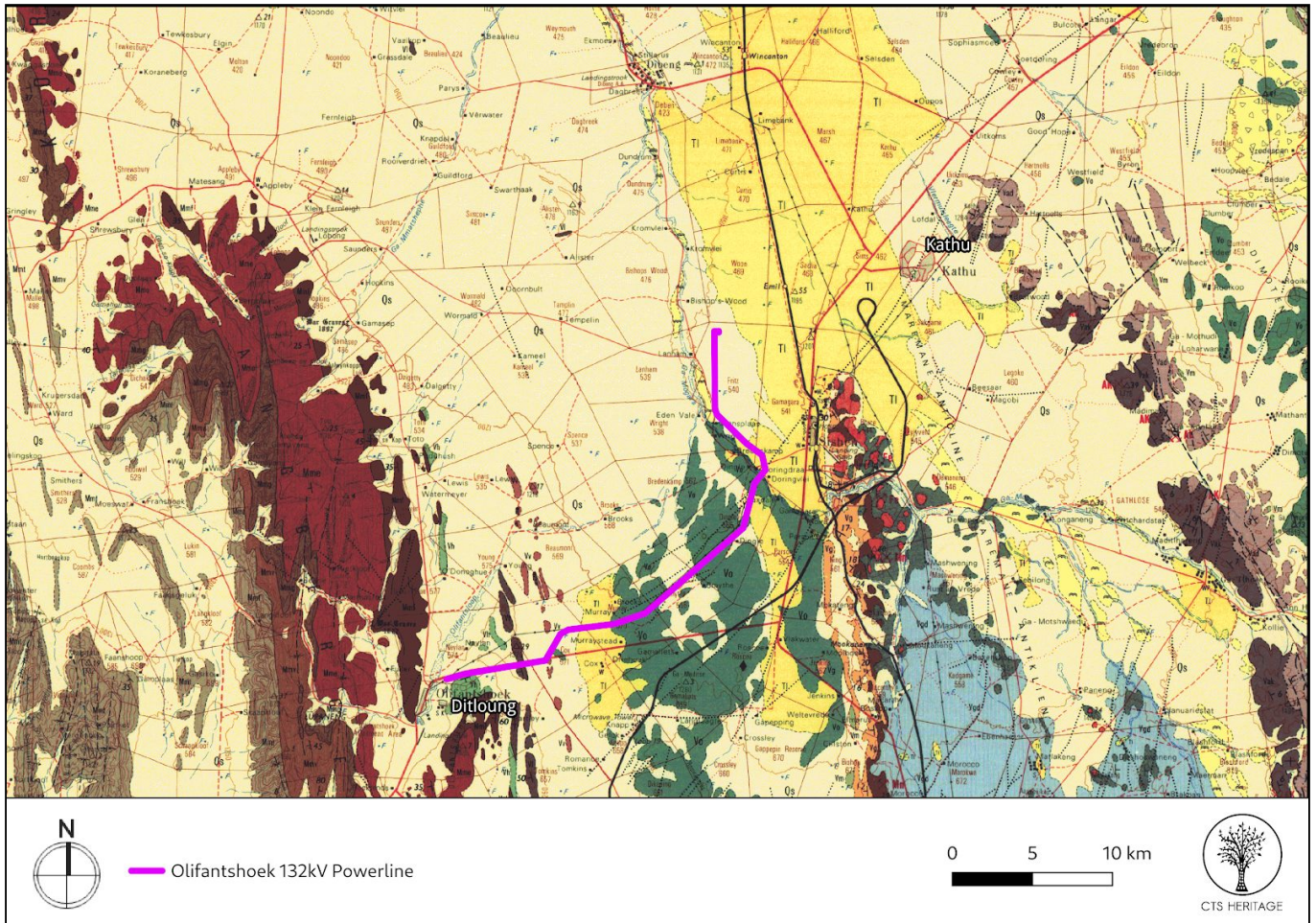


Figure 7. Geology Map. Indicating the underlying geology across the study area through overlaying the geology maps from the CGS series 2722 Kuruman (Qs: Quarternary Sands; Tl: Tertiary Surface Limestone; Vh: Hartley Formation volcanic rocks; Vl: Lucknow Formation; Vv: Voelwater Formation; Vo: Ongeluk Formation volcanic rocks)

4.3 Selected photographic record

See Archaeological Report in Appendix 1 for additional contextual images



Figure 8.1: Unmarked graves at NLN002 and 8.2: Collapsed stone walling at NLN001



Figure 8.3 and 8.4: LSA Flake from DNG001



Figure 8.5: Historical artefacts from MRR001 and 8.6: Graves from MRR002

5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

5.1 Assessment of impact to Heritage Resources

Archaeology

Very few archaeological resources of significance were identified during the field assessment. This is surprising due to the proximity of the proposed development to Kathu Pans. The one Later Stone Age artefact identified was located without context and as such, is not conservation-worthy (DNG001). Similarly, the collapsed stone wall identified as site NLN001 has no heritage significance and is not conservation-worthy. Site MRR001 includes historical evidence of occupation and use, however this site has been disturbed through erosion and has low local significance (Grade III C). Sites DNG001, NLN001 and MRR001 have been sufficiently recorded for the purposes of this assessment.



Both sites NLN002 and MRR002 consist of two sets of unmarked graves. By their nature, human remains have high social significance and as such, have been given a grading of Grade IIIA. These sites both fall within the proposed alignment corridor, however these sites may not be impacted by the proposed development.

Palaeontology

- The volcanic nature of the Ongeluk Formation makes it unlikely that it will yield fossils. Although mycelial fungus-like fossils have been recorded, these are microscopic and came from a site over 100km south of the proposed power line.
- The volcanic nature of the Hotazel Formation (Voëlwater Subgroup) makes it unlikely that it will yield fossils.
- The Moidraai Formation (Voëlwater Subgroup) could preserve stromatolites.
- The dolostones of the Lucknow Formation are known to yield stromatolites (from cm to dm wide).
- The volcanic nature of the Hartley Formation makes it unlikely that it will yield fossils.
- The Kalahari Group has a sparse and poorly diverse fossil record. However, the close proximity of the Kathu Pan deposits (11km) from the north-east terminal point of the proposed power line as well as the fact that the power line traverses the same geological formations as that of the Kathu Pan, make it that there is a possibility of fossil faunal assemblages being present.

Based on the geology of the proposed development area as well as the current palaeontological record, it is anticipated that the impact of the development will mainly be LOW to MODERATE. However, the north-east section of the power line traversing the Kalahari Group deposits may have HIGH impact due to the close proximity of the Kathu Pan deposits.

Table 3: Impacts of the proposed Olifantshoek 132kV powerline to heritage resources

NATURE: No archaeological resources of significance were identified during the field assessments for archaeology and the desktop assessment for palaeontology within the development footprint. Two sites consisting of unmarked burials were identified within the development footprint.				
		Archaeology		Palaeontology
MAGNITUDE	L (4)	No significant archaeological resources were identified within the development area, however a number of archaeological resources of low significance were identified. Two sites consisting of unmarked burials were identified within the development footprint (NLN002 and MRR002.)	L (4)	The palaeontological sensitivity of the bedrocks and superficial sediments within the study area is rated as low to very low .The impact would be very unlikely. However the north-east section of the power line traversing the Kalahari Group deposits may have HIGH impact due to the close proximity of the Kathu Pan deposits.
DURATION	H (5)	Where manifest, the impact will be permanent.	H (5)	Where manifest, the impact will be permanent.
EXTENT	L (1)	Limited to the development footprint	L (1)	Limited to the development footprint
PROBABILITY	P (3)	Probable - distinct possibility	I (2)	Improbable - some possibility
SIGNIFICANCE	M	$(4+5+1) \times 3 = 30$	L	$(4+5+1) \times 2 = 20$
STATUS		Neutral with mitigation		Neutral with mitigation
REVERSIBILITY	L	Any impacts to heritage resources that do occur are irreversible	L	Any impacts to heritage resources that do occur are irreversible
IRREPLACEABLE	L	Unlikely with mitigation	L	Unlikely with mitigation



LOSS OF RESOURCES?			
CAN IMPACTS BE MITIGATED		Yes	Yes
MITIGATION: A 50m no-go buffer is established around sites NLN002 and MRR002, and these sites are clearly marked as no-go areas on all development maps. Surface limestones of the Mokalanen Formation, before excavation takes place in order to confirm the absence of Kathu Pan-like deposits that may contain Pleistocene fossil faunal assemblages.			
RESIDUAL RISK: Should any significant resources be impacted (however unlikely) residual impacts may occur, including a negative impact due to the loss of potentially scientific cultural resources			

5.2 Sustainable Social and Economic Benefit

Olifantshoek will be developed further with Gamagara Municipality selling an additional R 15m worth of electricity per annum. This proposed development has high potential to result in secondary job opportunities due to the availability of additional services.

5.3 Proposed development alternatives

No alternatives are proposed for this development and as such, the only Alternative considered is the no-go alternative.

5.4 Cumulative Impacts

“Cumulative Impact” means the past, current and reasonably foreseeable future impact of an activity that in itself may not be significant, but may become significant when added to existing and reasonably foreseeable impacts eventuating from similar activities. As per Figure 3, the area proposed for development is by no means pristine. From a heritage impact perspective, it is preferable to group such developments together rather than have them spread across the landscape. As such, the proposed development will not result in unacceptable risk or loss, or an unacceptable increase in impact and it will not result in complete or wholesale changes to the environment or sense of place.

Table 4: Cumulative Impact Table

NATURE: Cumulative Impact to the sense of place				
		Overall impact of the proposed project considered in isolation		Cumulative impact of the project and other projects in the area
MAGNITUDE	L (4)	Low	L (4)	Low
DURATION	M (3)	Medium-term	H (4)	Long-term
EXTENT	L (1)	Low	L (1)	Low
PROBABILITY	L (2)	Improbable	H (3)	Probable
SIGNIFICANCE	L	$(4+3+1) \times 2 = 16$	L	$(4+4+1) \times 3 = 27$
STATUS		Neutral		Neutral
REVERSIBILITY	H	High	L	Low
IRREPLACEABLE LOSS OF RESOURCES?	L	Unlikely	L	Unlikely
CAN IMPACTS BE MITIGATED		NA		NA
CONFIDENCE IN FINDINGS: High				



MITIGATION: No impacts are anticipated and as such, no mitigation is required

6. RESULTS OF PUBLIC CONSULTATION

Consultation for this project is being undertaken as part of the EIA requirements by the EAP. No heritage-related comments have been received thus far in the process.

7. CONCLUSION AND RECOMMENDATIONS

This application is for the proposed establishment of a 132kV powerline from the Olifantshoek Substation to the Elim Substation located 13 km west of Kathu. The town of Kathu was established in the 1960's and 1970's as a result of the iron ore mining taking place at the neighbouring Sishen mine. It is important to note that the northern portion of the development lies in close proximity to the Grade I Kathu Pan Archaeological site. At Kathu Pan, north west of the town, evidence of early hominin occupation has been observed at multiple sinkhole sites within the pan, and the results of scientific investigation into these sites has been broadly published. These sites are known for its rich collection of Early Stone Age artefacts, and several Archaeological and Heritage Impact Assessments have recorded the area (see Figure 4 Appendix 3). These archaeological resources occur in areas associated with outcrops of banded ironstone, and the localised natural pan, with most coming specifically from sinkholes in the pan itself. Based on the geology and fossil record, a field scoping study is recommended in the Kalahari Group deposits, specifically the surface limestones, before excavation takes place in order to confirm the absence of Kathu Pan-like deposits that may contain Pleistocene fossil faunal assemblages.

However, the archaeological field assessment did not identify any archaeological resources of significance within the proposed alignment. Two sets of unmarked graves were identified within the proposed alignment, and these may not be impacted by the proposed development. It is recommended that a 50m no-go buffer is established around sites NLN002 and MRR002.

For the remainder of the power line, there is very little chance of significant fossil finds being made. Any fossil finds (in stromatolitic Mooidraai and Lucknow formations) are to be reported by the developer. Should important fossil material be found during excavations, the attached Fossil Finds Procedure must be implemented (Appendix 2).

As such, there is no objection to the proposed development on condition that:

- A 50m no-go buffer is established around sites NLN002 and MRR002, and these sites are clearly marked as no-go areas on all development maps.
- Surface limestones of the Mokalanen Formation must be inspected before excavation takes place in order to confirm the absence of Kathu Pan-like deposits that may contain Pleistocene fossil faunal assemblages.
- Should any human remains or evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources be impacted during the proposed development, work must cease and SAHRA APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) must be alerted to determine a way forward.



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8. REFERENCES

Impact Assessment References				
Nid	Report Type	Author/s	Date	Title
4116	AIA	Peter Beaumont	06/02/2008	Phase 1 Heritage Impact Assessment Report on a Portion of the Remainder of the Farm Sekgame 461, Kathu, Gamagara Municipality, Northern Cape Province
4117	AIA	Peter Beaumont	07/02/2008	Phase 1 Heritage Impact Assessment Report on Portion 463/8 of the Farm Uitkoms 463, near Kathu, Kgalagadi Municipality, Northern Cape Province
4372	AIA	David Morris	01/02/2005	Report on a Phase 1 Archaeological Assessment of Proposed Mining Areas of the Farms Bruce, King, Mokaning and Parson, Between Postmasburg and Kathu, Northern Cape
4376	AIA	Peter Beaumont	30/04/2006	Phase 1 Heritage Impact Assessment Report on Erf 1439, Remainder of Erf 2974 and Remainder of Portion 1 of the Farm Uitkoms No 463, and Farms Kathu 465 and Sims 462 at and near Kathu in the Northern Cape Province
4378	AIA	Peter Beaumont	30/05/2006	Phase 1 Heritage Impact Assessment Report on Portion 5 of the Farm Uitkoms 463, Kgalagadi District, Northern Cape Province
4379	AIA	Peter Beaumont	31/05/2006	Phase 1 Heritage Impact Assessment Report on Portions A and B of the Farm Sims 462, Kgalagadi District, Northern Cape Province
4387	AIA	Peter Beaumont	12/06/2008	Phase 1 Archaeological Impact Assessment Report on Portion 459/49 of the Farm Bestwood 459 at Kathu, Kgalagadi District Municipality, Northern Cape Province
4391	AIA	Cobus Dreyer	11/08/2008	First Phase Archaeological and Cultural Heritage Assessment of the Proposed Residential Developments at a Portion of the Remainder of the Farm Bestwood 459 Rd, Kathu, Northern Cape
4596	AIA	Peter Beaumont	01/05/2004	Heritage EIA of Two Areas at Sishen Iron Ore Mine
4597	AIA	Peter Beaumont	01/10/2005	Heritage Impact Assessment of an Area of the Sishen Iron Ore Mine that may be Covered by the Vliegveldt Waste Dump
4598	HIA	Peter Beaumont	15/10/2005	Heritage Impact Assessment for EMPR Amendment for Crusher at Sishen Iron Ore Mine
4600	AIA	Peter Beaumont	24/05/2007	Phase 1 Heritage Impact Assessment Report on a 15 Ha Portion of the Allotment Area That Borders on the Skerpdraai and Diepkloof Townships at Olifantshoek, Gamagara Municipality, Northern Cape Province
4603	AIA	David Morris	01/09/2008	Archaeological and Heritage Phase 1 Impact Assessment for Proposed Upgrading of Sishen Mine Diesel Depot Storage Capacity at Kathu, Northern Cape
4605	AIA	Peter Beaumont	03/04/2007	Phase 1 Heritage Impact Assessment Report on a Portion of the Farm Fuller 578 near Olifantshoek, Siyanda District Municipality, Northern Cape Province
6355	AIA	Cobus Dreyer	10/12/2008	First Phase Archaeological and Cultural Heritage Assessment of the Proposed Bourke Project, Ballast Site and Crushing Plant at Bruce Mine, Dingleton, near Kathu, Northern Cape
6639	AIA	Jonathan Kaplan	01/09/2008	Phase 1 Archaeological Impact Assessment: Proposed Housing Development, Erf 5168, Kathu, Northern Cape Province
6804	AIA	Peter Beaumont	01/04/2000	Archaeological Impact Assessment: Archaeological Scoping Survey for the Purpose of an EMPR for the Sishen Iron Ore Mine



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7413	AIA	David Morris	23/08/2001	Report on Assessment of Archaeological Resources in the Vicinity of Proposed Mining at Morokwa
8086	AIA	Johan Nel	14/11/2008	Final Report Heritage Resources Scoping Survey & Preliminary Assessment Transnet Freight Line EIA, Eastern Cape and Northern Cape
92575	HIA	Elize Becker	10/10/2012	Phase 1 Heritage Impact Assessment Kimberley to De Aar
108346	AIA	Christine Vivier	12/11/2009	Phase 1 archaeological impact assessment report on a portion of the farm Lylyveld 545 near Kathu, Kagalagadi District Municipality, Northern Cape province.
108351		Neels Kruger	01/04/2012	Archaeological impact assessment (AIA) of demarcated surface areas on the farms Fritz 540, Gamagara 541, Sishen 543 and Parsons 564, Sishen Iron Ore Mine Complex, Kgalagadi District Municipality, Northern Cape province.
108970	AIA	Nelius Kruger	01/09/2012	ARCHAEOLOGICAL IMPACT ASSESSMENT (AIA) OF DEMARCATED SURFACE AREAS ON THE FARMS GAMAGARA 541, ONVERWACHT 540 (FRITZ 540 PORTION 1) AND NOOITGEDACHT 469 (WOON 469), SISHEN IRON ORE MINE, KGALAGADI DISTRICT MUNICIPALITY, NORTHERN CAPE PROVINCE.
114648	PIA	John E Almond	01/09/2012	Palaeontological specialist assessment: desktop study PROPOSED 16 MTPA EXPANSION OF TRANSNET'S EXISTING MANGANESE ORE EXPORT RAILWAY LINE & ASSOCIATED INFRASTRUCTURE BETWEEN HOTAZEL AND THE PORT OF NGQURA, NORTHERN & EASTERN CAPE. Part 1: Hotazel
121132	HIA	Peter Beaumont	26/11/2011	Baseline Archaeological Reconnaissance Report on the Farm Lomoteng 669, North of Postmasburg in the Siyanda District Municipality of the Northern Cape Province
123045	AIA	Cobus Dreyer	26/06/2013	Report Eskom Garona Ferrum Mercury
123399	AIA	Peter Beaumont	15/05/2013	PHASE 2 ARCHAEOLOGICAL PERMIT MITIGATION REPORT ON A ~0.7 HA PORTION OF THE FARM BESTWOOD 549, SITUATED ON THE EASTERN OUTSKIRTS OF KATHU, JOHN TAOLO GAETSEWE DISTRICT MUNICIPALITY, NORTHERN CAPE PROVINCE.
129366	HIA	Cobus Dreyer	28/08/2013	First Phase Archaeological & Heritage Assessment of the Proposed Garona-Ferrum Transmission Line, Northern Cape
129751	HIA	Elize Becker	20/02/2013	Phase 1 Heritage Impact Assessment Hotazel to Kimberley and De Aar to Port of Ngqura
145005	AIA	Munyadziwa Magoma	01/07/2013	Phase 1 Archaeological Impact Assessment specialist study report for the proposed development of prospecting rights of iron ore and manganese on remaining extent of Mashwening 557 in Kathu, within the Local Municipality of Gamagara, John Taolo Gaetsewe
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152170	HIA	Robert de Jong	03/09/2008	HERITAGE IMPACT ASSESSMENT REPORT: PROPOSED RESIDENTIAL DEVELOPMENT AND ASSOCIATED INFRASTRUCTURE ON A 200 HA PORTION OF THE FARM BESTWOOD 429 RD AT KATHU, NORTHERN CAPE PROVINCE
152171	AIA	Cobus Dreyer	11/08/2008	FIRST PHASE ARCHAEOLOGICAL AND CULTURAL HERITAGE ASSESSMENT OF THE PROPOSED RESIDENTIAL DEVELOPMENTS AT A PORTION OF THE



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				REMAINDER OF THE FARM BESTWOOD 459RD, KATHU, NORTHERN CAPE
156617	AIA	David Morris	01/02/2014	Rectification and/or regularisation of activities relating to the Bestwood Township development near Kathu, Northern Cape: Phase 1 Archaeological Impact Assessment
161427	HIA	Stephan Gaigher	15/04/2014	Proposed Establishment of Several Electricity Distribution Lines within the Northern Cape Province
163959	HIA	Anton van Vollenhoven	17/03/2014	HIA Eskom Manganore to Ferrum Scoping Phase
167779	HIA	Jonathan Kaplan	30/06/2014	HERITAGE IMPACT ASSESSMENT PROPOSED MIXED USE DEVELOPMENT IN KATHU, NORTHERN CAPE PROVINCE Remainder & Portion 1 of the Farm Sims 462, Kuruman RD
170455	AIA	Neels Kruger	31/03/2014	ARCHAEOLOGICAL IMPACT ASSESSMENT (AIA) OF DEMARCATED SURFACE PORTIONS ON THE FARMS SACHA 468, SIMS 462 AND SEKGAME 461 FOR THE PROPOSED STORMWATER INFRASTRUCTURE (CLEAN WATER CUT-OFF BERM & GROUNDWATER DAM) FOR THE SISHEN MINE, KATHU, NORTHERN CAPE PROVI
170460	AIA	Neels Kruger	31/01/2014	ARCHAEOLOGICAL IMPACT ASSESSMENT (AIA) OF DEMARCATED SURFACE PORTIONS ON THE FARMS SACHA 468 AND WOON 469 FOR THE PROPOSED HIGH ENERGY FUEL PLANT AND RAILWAY SIDING, SISHEN IRON ORE MINE, JOHN TAOLO GAETSEWE DISTRICT MUNICIPALITY, NORTHERN CAPE PROVINCE
170660	AIA	Cobus Dreyer	31/01/2014	FIRST PHASE ARCHAEOLOGICAL & HERITAGE ASSESSMENT OF THE PROPOSED VAAL-GAMAGARA WATER PIPELINE PROJECT, NORTHERN CAPE: HOTAZEL ALTERNATIVE WATER PIPELINE
170664	AIA	Cobus Dreyer	28/09/2012	FIRST PHASE ARCHAEOLOGICAL AND HERITAGE ASSESSMENT OF THE PROPOSED VAAL-GAMAGARA WATER PIPELINE PROJECT, NORTHERN CAPE
170666	AIA	Cobus Dreyer	31/12/2013	FIRST PHASE ARCHAEOLOGICAL & HERITAGE ASSESSMENT OF THE VAAL-GAMAGARA WATER PIPELINE PROJECT, NORTHERN CAPE: REVISIT TO THE KATHU PAN ARCHAEOLOGICAL SITE
174359	AIA	Neels Kruger	25/08/2014	ARCHAEOLOGICAL IMPACT ASSESSMENT (AIA) OF DEMARCATED SURFACE PORTIONS ON THE FARMS SACHA 468 AND WOON 469 FOR THE PROPOSED HIGH ENERGY FUEL PLANT AND RAILWAY SIDING, SISHEN IRON ORE MINE, JOHN TAOLO GAETSEWE DISTRICT MUNICIPALITY, NORTHERN CAPE PROVINCE
177105	HIA	Cobus Dreyer	10/05/2014	FIRST PHASE ARCHAEOLOGICAL & HERITAGE INVESTIGATION OF THE PROPOSED MINE PROSPECTING AT THE REMAINING EXTENT OF THE FARM INGLESBY 580 NEAR OLIFANTSHOEK, NORTHERN CAPE PROVINCE
251178	AIA	Peter Beaumont		Baseline Archaeological Reconnaissance Report on the Farm Lomoteng 669, North of Postmasburg in the Siyanda District Municipality of the Northern Cape Province
251329	AIA	Jayson Orton	20/02/2015	Heritage Impact Assessment for a Proposed 132 kV Power Line, Kuruman Magisterial District, Northern Cape
252975	HIA	Marko Hutten, Polke Birkholtz	18/07/2014	Heritage Impact Assessment for the Proposed Kathu Supplier Park on parts of the Remainder and on Portion 9 of the Farm Sekgame 461 on the southern side of the town of Kathu in the Gamagara Local Municipality, Northern Cape.
273602	HIA	Polke Birkholtz	20/04/2015	Heritage Impact Assessment for the Proposed Establishment of a Grazing



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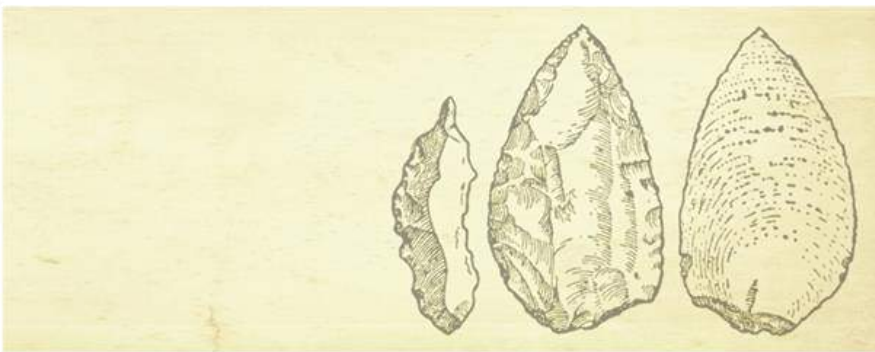
				Project on a Portion of the Farm Marsh 467, Dingleton, Gamagara Local Municipality, Northern Cape.
279906	AIA	Neels Kruger	02/12/2014	ARCHAEOLOGICAL IMPACT ASSESSMENT (AIA) OF DEMARCATED SURFACE PORTIONS ON THE FARM SEKGAME 461 FOR THE PROPOSED SEKGAME ELECTRICITY INFRASTRUCTURE EXPANSION PROJECT, SISHEN MINE, NORTHERN CAPE PROVINCE
294454	AIA	Neels Kruger	05/04/2015	ARCHAEOLOGICAL IMPACT ASSESSMENT (AIA) OF AREAS DEMARACTED FOR THE PROPOSED LYLEVELD NORTH WASTE ROCK DUMP EXPANSION AND LYLEVELD SOUTH HAUL ROAD EXTENSION PROJECT, SISHEN MINE, NORTHERN CAPE PROVINCE



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APPENDICES

APPENDIX 1: Specialist Archaeology Assessment



PHASE 1 AIA FIELD REPORT PROPOSED DEVELOPMENT OF 132KV POWERLINE NEAR OLIFANTSHOEK, NORTHERN CAPE PROVINCE

PROPOSED DEVELOPMENT OF 132KV POWERLINE FROM THE EMIL SUBSTATION TO
THE SOON-TO-BE CONSTRUCTED OLIFANTSHOEK SUBSTATION NEAR THE TOWN OF
OLIFANTSHOEK, GAMAGARA LOCAL MUNICIPALITY, JOHN TAOLO GAETSEWE
DISTRICT MUNICIPALITY, NORTHERN CAPE

PREPARED FOR:

CTS HERITAGE

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For this project, Mr Engelbrecht was responsible for the field survey of the development footprint, identification of heritage resources, and recommendations. Ms Fivaz was responsible for report compilation.

Declaration of independence:

We, Jan Engelbrecht and Heidi Fivaz, partners of UBIQUE Heritage Consultants, hereby confirm our independence as heritage specialists and declare that:

- we are suitably qualified and accredited to act as independent specialists in this application;
- we do not have any vested interests (either business, financial, personal or other) in the proposed development project other than remuneration for the heritage assessment and heritage management services performed;
- the work was conducted in an objective and ethical manner, in accordance with a professional code of conduct and within the framework of South African heritage legislation.



Signed:
J.A.C. Engelbrecht & H. Fivaz
UBIQUE Heritage Consultants

Date: 2020-02-12

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ABBREVIATIONS

AIA:	Archaeological Impact Assessment
ASAPA:	Association of South African Professional Archaeologists
BIA:	Basic Impact Assessment
CRM:	Cultural Resource Management
ECO:	Environmental Control Officer
EIA:	Environmental Impact Assessment*
EIA:	Early Iron Age*
EMP:	Environmental Management Plan
ESA:	Earlier Stone Age
GPS:	Global Positioning System
HIA:	Heritage Impact Assessment
LIA:	Late Iron Age
LSA:	Later Stone Age
MEC:	Member of the Executive Council
MIA:	Middle Iron Age
MPRDA:	Mineral and Petroleum Resources Development Act
MSA:	Middle Stone Age
NEMA:	National Environmental Management Act
NHRA:	National Heritage Resources Act
OWC:	Orange River Wine Cellars
PRHA:	Provincial Heritage Resource Agency
SADC:	Southern African Development Community
SAHRA:	South African Heritage Resources Agency

**Although EIA refers to both Environmental Impact Assessment and the Early Iron Age both are internationally accepted abbreviations it must be read and interpreted in the context it is used.*

GLOSSARY

Archaeological: material remains, resulting from human activity, which is in a state of disuse and is in or on land and is older than 100 years, including artefacts, human and hominid remains and artificial features and structures;

- rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and is older than 100 years (as defined and protected by the National Heritage Resources Act (NHRA) (Act No. 25 of 1999) including any area within 10 m of such representation;
- wrecks, being any vessel or aircraft, or any part thereof, which were wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the culture zone of the Republic, as defined respectively in sections 3, 4 and 6 of the Maritime Zones Act, 1994 (Act No. 15 of 1994), and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation;

- features, structures and artefacts associated with military history, which are older than 75 years and the sites on which they are found.

Stone Age: The first and longest part of human history is the Stone Age, which began with the appearance of early humans between 3-2 million years ago. Stone Age people were hunters, gatherers and scavengers who did not live in permanently settled communities. Their stone tools preserve well and are found in most places in South Africa and elsewhere.

Earlier Stone Age: >2 000 000 - >200 000 years ago
Middle Stone Age: <300 000 - >20 000 years ago
Later Stone Age: <40 000 - until the historical period

Iron Age: (Early Farming Communities). The period covering the last 1800 years, when immigrant African farmer groups brought a new way of life to southern Africa. They established settled villages, cultivated domestic crops such as sorghum, millet and beans, and herded cattle as well as sheep and goats. As they produced their iron tools, archaeologists call this the Iron Age.

Early Iron Age:	AD 200 - AD 900
Middle Iron Age:	AD 900 - AD 1300
Later Iron Age:	AD 1300 - AD 1850

Historic: Period of the arrival of white settlers and colonial contact.
AD 1500 to 1950

Historic building: Structures 60 years and older.

Fossil: Mineralised bones of animals, shellfish, plants and marine animals. A trace fossil is the track or footprint of a fossil animal that is preserved in stone or consolidated sediment.

Heritage: That which is inherited and forms part of the National Estate (historic places, objects, fossils as defined by the National Heritage Resources Act 25 of 1999).

Heritage resources: These mean any place or object of cultural significance, tangible or intangible.

Holocene: The most recent geological period that commenced 10 000 years ago.

Palaeontology: Any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site that contains such fossilised remains or traces

Cumulative impacts: “Cumulative Impact”, in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity that may not be significant, but may become significant when added to existing and reasonably foreseeable impacts eventuating from similar or diverse activities.

Mitigation: Anticipating and preventing negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible.

- A 'place':
- a site, area or region;
 - a building or other structure which may include equipment, furniture, fittings and articles associated with or connected with such building or other structure;
 - a group of buildings or other structures which may include equipment, furniture, fittings and articles associated with or connected with such group of buildings or other structures;
 - an open space, including a public square, street or park; and
 - in relation to the management of a place, includes the immediate surroundings of a place.
- 'Public monuments and memorials': mean all monuments and memorials—
- erected on land belonging to any branch of central, provincial or local government, or on land belonging to any organisation funded by or established in terms of the legislation of such a branch of government; or
 - which were paid for by public subscription, government funds, or a public-spirited or military organisation, and are on land belonging to any private individual;
- 'Structures': any building, works, device or other facility made by people and which are fixed to land, and include any fixtures, fittings and equipment associated therewith.

1. INTRODUCTION

UBIQUE Heritage Consultants were appointed by CTS Heritage as independent heritage specialists to conduct the Phase 1 field surveys for the Archaeological Impact Assessment of the proposed development of a 132kV powerline near Olifantshoek, in the Gamagara Local Municipality, John Taolo Gaetsewe District Municipality, Northern Cape, as required by Section 38 of the NHRA and the National Environmental Management Act 107 of 1998 (NEMA).

The proposed project involves the construction and operation of a grid connection infrastructure between the existing Emil substation and the soon-to-be constructed Olifantshoek substation near the town of Olifantshoek in the Northern Cape Province. The grid infrastructure will be used to strengthen the grid network in the area to ensure an adequate supply of electricity for the residents within the Municipality's jurisdictional area. The grid connection infrastructure will only include a single circuit power line with a capacity of up to 132kV. The power line is being assessed within a 300m wide and 36km long corridor which will allow for the optimisation of the infrastructure to be developed and to avoid identified environmental sensitivities. The height of the power line pylons will be up to 20m. The servitude of the power line will be 31m in width.

The identified heritage resources and anticipated, and cumulative impacts that the development of the proposed project may have on the identified heritage resources are presented objectively in this report. Alternatives, should any significant sites be impacted adversely by the proposed project, are offered. All effort will be made to ensure that all studies, assessments and results comply with the relevant legislation and the code of ethics and guidelines of the Association of South African Professional Archaeologists (ASAPA). The report aims to assist the developer in responsibly managing the documented heritage resources, and to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act of 1999 (Act 25 of 1999).

1.1 Technical information

Project description	
Project name	PROPOSED DEVELOPMENT OF 132kV POWERLINE NEAR OLIFANTSHOEK, NORTHERN CAPE PROVINCE
Description	The development of a 132kV powerline near Olifantshoek, in the Gamagara Local Municipality, John Taolo Gaetsewe District Municipality, Northern Cape
Developer	
Gamagara Local Municipality	
Development type	Electrical Infrastructure
Property details	
Province	Northern Cape
District municipality	John Taolo Gaetsewe
Local municipality	Gamagara
Topo-cadastral map	1:50 000 2722DD
Farm name	Remaining Extent of the Farm Fritz 540, Portion 1 of the Farm Fritz 540,

	Portion 2 of the Farm Fritz 540, Portion 4 of the Farm Fritz 540, Portion 5 of the Farm Fritz 540, Portion 10 of the Farm Fritz 540, Remaining Extent of the Farm Gamagara 541, Portion 1 of the Farm Gamagara 541, Portion 7 of the Farm Gamagara 541, Portion 2 of the Farm Dingle 565, Remaining Extent of the Farm Dingle 565, Remaining Extent of the Farm Smythe 566, Remaining Extent of the Farm Murray 570, Portion 2 of the Farm Murray 570, Remaining Extent of the Farm Cox 571, Portion 1 of the Farm Cox 571, Portion 3 of the Farm Cox 571, Portion 4 of the Farm Cox 571, Remaining Extent of the Farm Hartley 573, Remaining Extent of the Farm Diegaart's Heuwel 765, Portion 1 of the Farm Neylan 574	
Closest town	Olifantshoek, Kathu	
GPS Co-ordinates	27° 55'52.67"S 22° 44'55.33"E	
Property size		
Development footprint	300m wide and 36km long corridor	
Land use		
Previous	Agriculture	
Current	Agriculture	
Rezoning required	No	
Sub-division of land	No	
Development criteria in terms of Section 38(1) NHRA		Yes/No
Construction of a road, wall, power line, pipeline, canal or other linear form of development or barrier exceeding 300m in length.		Yes
Construction of bridge or similar structure exceeding 50m in length.		No
Construction exceeding 5000m ² .		Yes
Development involving three or more existing erven or subdivisions.		No
Development involving three or more erven or divisions that have been consolidated within the past five years.		No
Rezoning of site exceeding 10 000m ² .		No
Any other development category, public open space, squares, parks, recreation grounds.		No

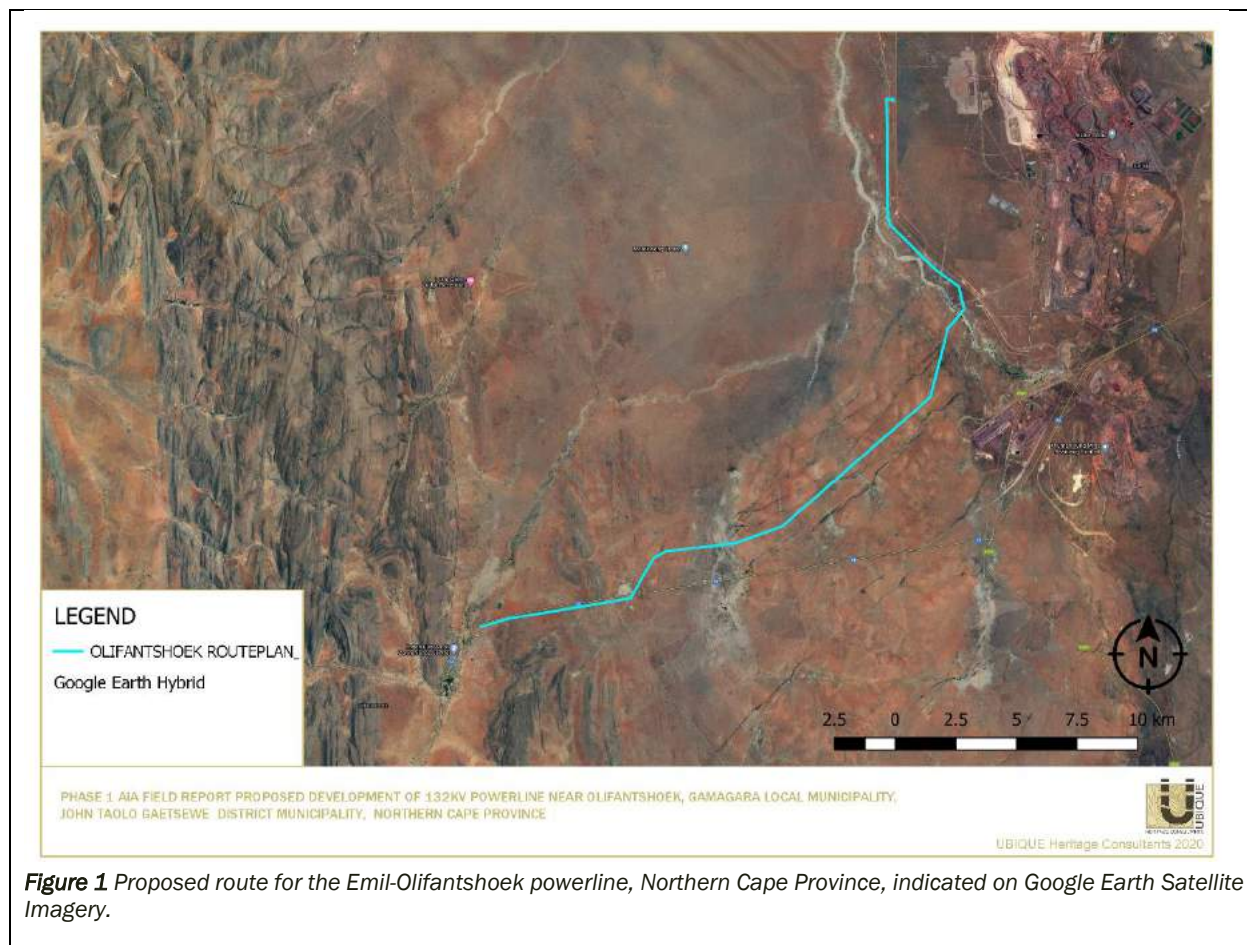


Figure 1 Proposed route for the Emil-Olifantshoek powerline, Northern Cape Province, indicated on Google Earth Satellite Imagery.

2. FIELD ASSESSMENT

2.1 Methodology

2.1.1 Systematic survey

A systematic survey of the proposed project area to locate, identify, record, photograph and describe sites of archaeological, historical or cultural interest, was completed.

UBIQUE Heritage Consultants inspected the proposed development corridors and surrounding areas on the 6th, 7th and 8th of February 2020. The areas surveyed for the impact assessment was dictated by the Google Earth maps of the development footprints provided by the client, as well as the Heritage Screener compiled by CTS Heritage. The powerline route was surveyed from Olifantshoek town at the location for the new proposed substation, towards the Emil substation. The starting point for the survey was 27° 55' 53.6" S; 22° 44' 50.5" E. All the study areas were surveyed in transects of approximately 30 - 50m where possible. The development corridor was surveyed on foot and by 4x4 vehicle by a team of two experienced surveyors.

We conducted an inspection of the surface of the ground, wherever the surface was visible. The archaeological survey was done with no substantial attempt to clear brush, sand, deadfall, leaves or other material that may cover the surface and with no attempt to look beneath the surface beyond the inspection of rodent burrows, cut banks and other exposures fortuitously observed.

2.1.2 Recording significant areas

GPS points of identified significant areas were recorded with handheld Garmin global positioning units (Garmin eTrex 10) and Android Locus Maps application on Hisense U605 smartphone. Photographs were taken with a Canon Ixus 190 20-megapixel camera. Detailed field notes were taken to describe observations (Appendix B).

2.1.3 Determining significance

Levels of the significance of the various types of heritage resources observed and recorded in the project area have been determined according to criteria set out in Appendix A.

2.1.4 Assumptions and limitations

It is assumed that the description of the proposed project, as provided by the client, is accurate. Furthermore, it is assumed that the public consultation process undertaken as part of the Environmental Impact Assessment (EIA) is comprehensive and does not have to be repeated as part of the heritage impact assessment.

The significance of the sites, structures and artefacts is determined through their historical, social, aesthetic, technological and scientific value in relation to their uniqueness, condition of preservation and research potential. The various aspects are not mutually exclusive, and the evaluation of any site is done with reference to any number of these aspects. Cultural significance is site-specific and relates to the content and context of the site.

Although all possible care has been taken during the comprehensive field survey and intensive desktop study to identify sites of cultural importance within the development areas, it is essential to note that some heritage sites may have been missed due to their subterranean nature, or due to dense vegetation cover. No subsurface investigation (i.e. excavations or sampling) were undertaken since a permit from SAHRA is required for such activities. Furthermore, access to the various farms was impeded by gates locked by farmers or Eskom. Contact details provided for relevant landowners proved unhelpful in some instances, as several farmers do not reside on the affected properties. Some farmers were not available on their mobile phones due to bad cell service or were busy and unable to assist, while others were unwilling to provide access due to general negativity towards the development on their farms. All effort has been made to cover as much ground as possible in the circumstances.

Therefore, should any heritage features and/or objects such as architectural features, stone tool scatters, artefacts, human remains, or fossils be uncovered or observed during construction, operations must be stopped, and a qualified archaeologist contacted for an assessment of the find. Observed or located heritage features and/or objects may not be disturbed or removed in any way until such time that the heritage specialist has been able to assess the significance of the site (or material) in question.

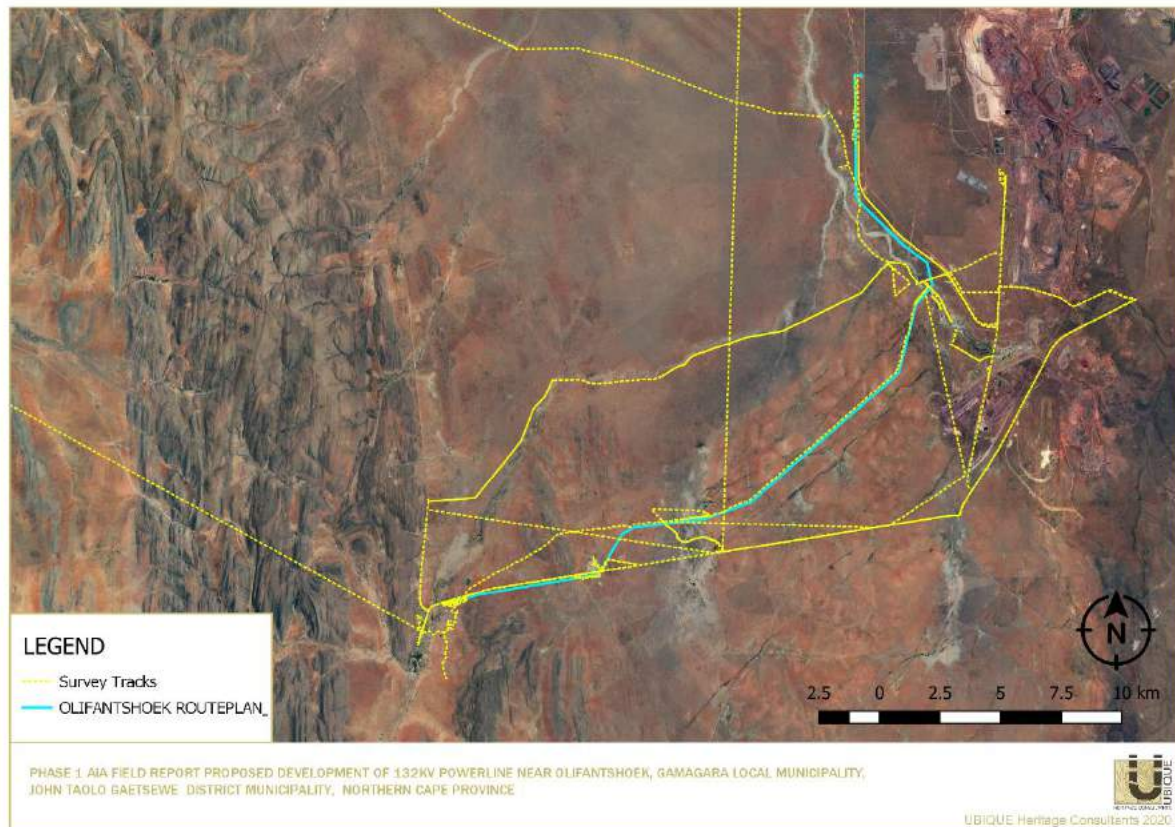


Figure 2 Recorded tracks of the survey along the proposed development footprint

2.2 Description of the affected environment

The landscape of the study area is typical Olifantshoek Plains Thornveld and Kathu Bushveld (Mucina & Rutherford 2006). It ranges from wide plains with open trees and shrub layers and sparse grass layers, to medium-tall tree layers, with extensive shrub and variable grass cover. Flat red aeolian sand plains with minor dunes interspersed with gravel pavements constitute the majority of the terrain. Vegetation noted across the development footprint include Camel Thorn trees (*Acacia erioloba*), Black Thorn trees (*Acacia mellifera*), Three Thorn/Driedoring (*Rhigozum trichotomum*), Skaapbossie (*Aizoon schellenbergii*), Shepherd tree (*Boscia albitrunca*), Suurgras (*Enneapogon desvauxii*), Tall Bushman grass (*Stipagrostis hirtigluma*), Silky Bushman grass (*Stipagrostis uniplumis*), Kortbeen Boesmangras (*Stipagrostis obtuse*), Pencil milk bush (*Euphorbia lignose*) and Hereroland aloe (*Aloe hereroensis*). The Langeberg mountain range is visible towards the western horizon. Several dry riverine beds are present on the site flowing from north to south and from west to east, but no perennial rivers or riverine were crossed.

The development footprint is bounded in the north by mine activities (Khumani/Sishen/Dingleton) mines and the existing Emil Eskom substation, and in the south by the N14 National road and open farmland. The Olifantshoek townscape and Langeberg mountain range frame the development in the west, while the N14 National road and mining activities bound the development in the east. Anthropogenic disturbances occur predominantly along existing roads within the development footprint, at the new substation location at Olifantshoek, and near Emil substation, where some trenches traverse the footprint.



Figure 3. Panoramic view of the proposed Olifantshoek substation site and access road to the site.



Figure 4. Human-made furrow and existing powerlines on the development footprint close to Olifantshoek.

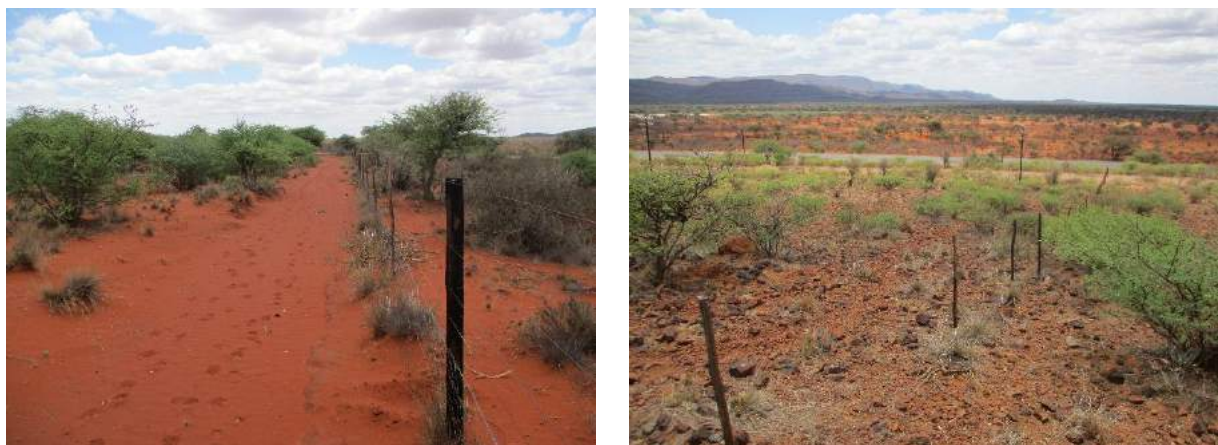


Figure 5. Panoramic view of the proposed powerline route south of the N14, from north-west to south-east.



Figure 6. Panoramic view of Emil substation and servitude road.



Figure 7. Formal cemeteries situated at Welgelee and Ditlouw informal settlements.



Figure 8. Formal cemetery situated at Diepkloof informal settlement and Olifantshoek municipal cemetery.

2.3 Archaeological resources identified

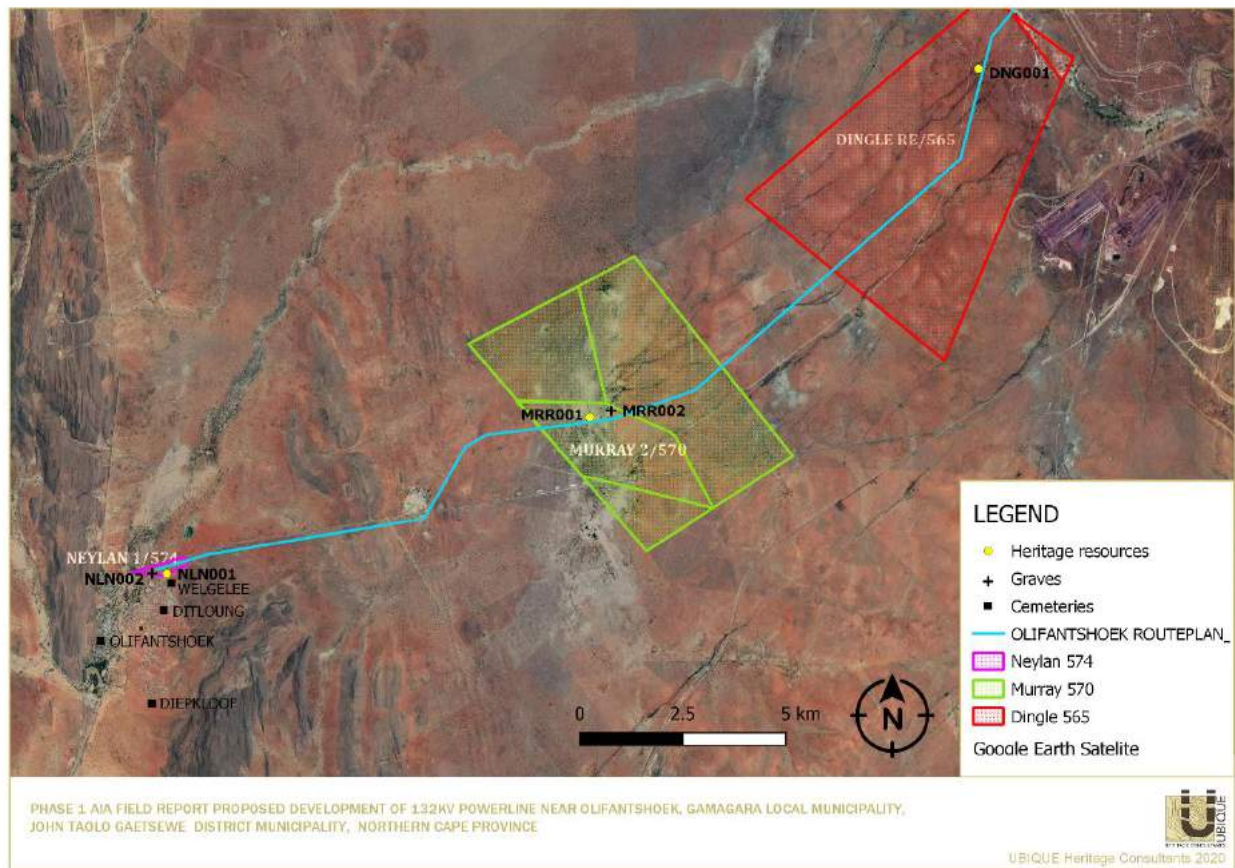


Figure 9. Recorded heritage resources across the development alternatives.

Point ID	Site No.	Site name	Description	Co-ordinates	Grading	Mitigation
Archaeological resources within the development footprint						
002	NLN002	Neylan No. 574/1-002	Two unmarked graves in the vicinity of a proposed new substation at Olifantshoek	27° 55' 52.6" S 22° 44' 51.4" E	IIIA	The site should be included in the heritage register and not be mitigated (high significance)
003	NLN001	Neylan No. 574/1-002	Collapsed stone wall orientation east to west. Approximately 100m in length. Possible fencing wall, linear without any angles or kraal shaped.	27° 55' 54.6" S 22° 45' 03.6" E	NCW	Phase 1 is seen as sufficient recording, and it may be demolished (low significance)
017	MRR001	Murray No. 570/2-001	Colonial/historical settlement ca. 1910-1950. Next to a natural water source, currently dry. Evidence of stone walls, crib, possible kraal, old Fig tree (<i>Ficus carica</i>) and material culture such as glass, ceramics and metal objects. Multiple occupations are evident. Disturbed by natural erosion.	27° 53' 58.7" S 22° 51' 00.0" E	IIIC	Phase 1 is seen as sufficient recording, and it may be demolished (low significance)

020	MRR002	Murray No. 570/2-002	Two unmarked graves on "Murray" farm. Possibly older than 100 years. Soldered tin and ammunition rest found in superficial association with the burials.	27° 53' 50.2" S 22° 51' 18.4" E	IIIA	The site should be included in the heritage register and not be mitigated (high significance)
019	DNG001	Dingle No. 565/RE/001	Isolated LSA CCS bladelet. N=1 in 100m².	27° 49' 37.9" S 22° 56' 29.3" E	NCW	Phase 1 is seen as sufficient recording, and it may be demolished (low significance)
Point ID	Site No.	Site name	Description	Co-ordinates	Grading	Mitigation
Other (outside development footprint)						
006	OFH006	Welgelee cemetery	Welgelee informal settlement official municipal cemetery	27° 55' 52.6" S 22° 44' 51.4" E	IIIA	The site should be included in the heritage register and not be mitigated (high significance)
007	OFH007	Ditloug cemetery	Ditloug informal settlement official municipal cemetery	27° 56' 01.9" S 22° 45' 07.6" E	IIIA	The site should be included in the heritage register and not be mitigated (high significance)
008	OFH008	Diepkloof cemetery	Diepkloof informal settlement official municipal cemetery	27° 56' 22.0" S 22° 45' 01.0" E	IIIA	The site should be included in the heritage register and not be mitigated (high significance)
009	OFH009	Olifantshoek cemetery	Olifantshoek town official municipal cemetery	27° 57' 31.7" S 22° 44' 51.2" E	IIIA	The site should be included in the heritage register and not be mitigated (high significance)

2.3.1 Heritage resources within the development corridor

Only five incidences of heritage resources were documented along the 36km development corridor. NLN001 and NLN002 are situated on the Farm Neylan No. 574 Portion 1 in the vicinity of the proposed location of the new to-be-constructed substation at Olifantshoek, MRR001 and MRR002, are located to the east on the farm Murray No. 570 Portion 2, and DNG001 is situated towards the north-east on the Remainder of the farm Dingle No. 565.

2.3.1.1 Archaeological

Recorded at NLN001 is the remains of a collapsed stone wall, approximately 100m in length and orientated east to west, without archaeological context and of low significance.

MRR001 is the remains of an early 20th-century settlement, ca. 1910-1950, located next to naturally occurring springs. Evidence of stone walls, a crib, possible kraal, two old Fig trees (*Ficus carica*), and surface material such as glass, ceramics and metal objects were recorded. Multiple occupation events are evident at this site and this site could've served as a livestock post/overnight camp while moving with the stock between farms or regions. The site has been partially disturbed and eroded during the recent past.

DNG001 is the occurrence of an isolated LSA CCS bladelet/trimmed flake, with no further archaeological matrix. These archaeological samples are small, without sufficient context, and therefore of low significance.

2.3.1.2 Graves

The surveyors documented four informal graves beside the development footprint. MRR002 comprises of two adult-sized graves, possibly older than 100 years, defined by stone cairns remains and unmarked stone headstones. Hand-soldered tin fragments and ammunition rests were found close to these graves. These graves are situated far enough north of the proposed powerline route to be outside of the impact of the development.

NLN002, however, lies less than 100m to the west of the area earmarked for the construction of the new Olifantshoek substation. Two adult-sized graves were documented at this location. One was marked by a stone cairn and stone headstone, and the adjacent one with a cement border. None of these graves is inscribed. These graves may fall within the development impact zone.

All graves are of high significance and care should be taken to protect them. The graves are of Local significance with Field Rating/Grade IIIC.

2.3.2 Other

Four formal municipal cemeteries are located to the south and south-west of the proposed Olifantshoek substation, well outside the development footprint. These include the Welgelee, Ditlounge and Diepkloof settlements' and the Olifantshoek town cemeteries.

2.3.3 Selected photographic record



NLN001



DNG001



MRR001



MRR001



MRR001



NLN002



NLN002



MRR002



MRR002



MRR002

Figure 10 Heritage recorded within the development footprint.

3. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

Description	Development Impact		Mitigation	Field rating/ Significance
1. NLN001 Historical stone-wall	Nature	Negative	No mitigation required	Field Rating of Local Grade IVC or NCW (low significance)
	Extent	Low		
	Duration	High		
	Intensity	Low		
	Potential of impact on irreplaceable resource	Low		
	Consequence	Low		
	Probability of impact	Medium		
	Significance	Low		
2. MRR001 Late-19 th -century to mid-20 th -century settlement/livestock camp at natural spring.	Nature	Negative	No mitigation required	Field Rating of Local Grade IVC, IIIC (low significance)
	Extent	Low		
	Duration	Low		
	Intensity	Medium		
	Potential of impact on irreplaceable resource	Low		
	Consequence	Low		
	Probability of impact	Medium		
	Significance	High		

3. DNG001 Isolated LSA lithic without archaeological context.	Nature	Negative	No mitigation required	Field Rating of Local Grade IVC or NCW (low significance)
	Extent	Low		
	Duration	High		
	Intensity	High		
	Potential of impact on irreplaceable resource	Low		
	Consequence	Low		
	Probability of impact	Low		
Significance	Low			
4. NLN002 Two graves situated close to the development footprint of the Olifantshoek substation.	Nature	Negative	Sites should be included in the heritage register and may not be mitigated	Field Rating of Local Grade IIIA (high significance)
	Extent	High		
	Duration	High		
	Intensity	High		
	Potential of impact on irreplaceable resource	High		
	Consequence	High		
	Probability of impact	Medium		
Significance	High			
5. MRRO02 Two graves situated north, and just outside the development corridor.	Nature	Negative	Sites should be included in the heritage register and may not be mitigated	Field Rating of Local Grade IIIA (high significance)
	Extent	Medium		
	Duration	Low		
	Intensity	Low		
	Potential of impact on irreplaceable resource	Low		
	Consequence	High		
	Probability of impact	Medium		
Significance	High			
Other				
6. Four local cemeteries situated at Welgelee, Ditzlouw and Diepkloof settlements and Olifantshoek town.	Nature	Negative	Sites should be included in the heritage register and may not be mitigated	Field Rating of Local Grade IIIA (high significance)
	Extent	High		
	Duration	High		
	Intensity	High		
	Potential of impact on irreplaceable resource	Low		
	Consequence	High		
	Probability of impact	Low		
Significance	High			

The proposed development will have a negative impact on the heritage resources situated on the proposed powerline route. The effect will be either inconsequential as the heritage resources are deemed of low significance and not conservation worthy (NCW) (sites: NLN001, DNG001, and MRRO01); or it is possible to mitigate the impact with a buffer no-go zone (NLN002 and MRRO02). From a heritage point of view, the development can continue, taking into consideration the recommended mitigatory actions.

4. RECOMMENDATIONS AND CONCLUSIONS

Based on the assessment of the potential impact of the development on the identified heritage, the following recommendations are made, taking into consideration any existing or potential sustainable social and economic benefits:

1. Archaeologically speaking, there are no objections to the proposed development proceeding along the projected route.

2. It is recommended that a no-go buffer of 50 m from the edge of each site extent, be implemented for sites graded as IIIC. A buffer zone is of particular importance for site NLN002.
3. If it is not possible to avoid the sites mentioned above, they must be mitigated by a qualified archaeologist. A permit in terms of section 35 of the NHRA and Chapter II and IV of the NHRA Regulations must be applied for from SAHRA via SAHRIS before construction.
4. Although all possible care has been taken to identify sites of cultural importance during the investigation of study areas, it is always possible that hidden or sub-surface sites could be overlooked during the assessment. If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) must be alerted as per section 35(3) of the NHRA.
5. If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Mimi Seetelo 012 320 8490), must be alerted immediately as per section 36(6) of the NHRA. A professional archaeologist or palaeontologist, depending on the nature of the finds, must be contacted as soon as possible to inspect the findings. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA;
6. UBIQUE Heritage Consultants and its personnel will not be held liable for such oversights or costs incurred as a result of such omissions.

5. REFERENCES

Mucina, L. & Rutherford, M.C. (eds) 2006. *The vegetation of South Africa, Lesotho and Swaziland*. Strelitzia 19. SANBI: Pretoria.

APPENDIX A

Determining significance and development impacts

Levels of the significance of the various types of heritage resources observed and recorded in the project area will be determined to the following criteria:

Cultural significance:

- Low A cultural object being found out of context, not being part of a site or without any related feature/structure in its surroundings.
- Medium Any site, structure or feature being regarded as less important due to several factors, such as date and frequency. Likewise, any important object found out of context.
- High Any site, structure or feature regarded as important because of its age or uniqueness. Graves are always categorised as of high importance. Likewise, any principal object found within a specific context.

Heritage significance:

- Grade I Heritage resources with exceptional qualities to the extent that they are of national significance
- Grade II Heritage resources with qualities giving it provincial or regional importance although it may form part of the national estate
- Grade III Other heritage resources of local importance and therefore worthy of Conservation

Field ratings:

- i. National Grade I significance should be managed as part of the national estate
- ii. Provincial Grade II significance should be managed as part of the provincial estate
- iii. Local Grade IIIA should be included in the heritage register and not be mitigated (high significance)
- iv. Local Grade IIIB should be included in the heritage register and may be mitigated (high/ medium significance)
- v. General protection A (IV A) site should be mitigated before destruction (high/ medium significance)

- | | | |
|------|-----------------------------|--|
| vi. | General protection B (IV B) | site should be recorded before destruction (medium significance) |
| vii. | General protection C (IV C) | phase 1 is seen as sufficient recording, and it may be demolished (low significance) |

Heritage value, statement of significance:

- a. its importance in the community, or pattern of South Africa's history;
- b. its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
- c. its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
- d. its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
- e. its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
- f. its importance in demonstrating a high degree of creative or technical achievement at a particular period;
- g. its strong or unique association with a particular community or cultural group for social, cultural or spiritual reasons;
- h. its strong or unique association with the life or work of a person, group or organisation of importance in the history of South Africa; and
- i. sites of significance relating to the history of slavery in South Africa.

Assessment of development impacts

A heritage resource impact may be defined broadly as the net change, either beneficial or adverse, between the integrity of a heritage site with and without the proposed development. Beneficial impacts occur wherever a proposed development actively protects, preserves or enhances a heritage resource, by minimising natural site erosion or facilitating non-destructive public use, for example. More commonly, development impacts are adverse and can include:

- destruction or alteration of all or part of a heritage site;
- isolation of a site from its natural setting; and/or
- introduction of physical, chemical or visual elements that are out of character with the heritage resource and its setting.

Beneficial and adverse impacts can be direct or indirect, as well as cumulative, as implied by the examples. Although indirect impacts may be more difficult to foresee, assess and quantify, they must form part of the assessment process. The following assessment criteria have been used to assess the impacts of the proposed development on possible identified heritage resources:

Criteria	Rating Scales	Notes
Nature	Positive	An evaluation of the type of effect the construction, operation and management of the proposed development would have on the heritage resource.
	Negative	
	Neutral	
Extent	Low	Site-specific affects only the development footprint.
	Medium	Local (limited to the site and its immediate surroundings, including the surrounding towns and settlements within a 10 km radius);
	High	Regional (beyond a 10 km radius) to national.
Duration	Low	0-4 years (i.e. duration of construction phase).
	Medium	5-10 years.
	High	More than 10 years to permanent.
Intensity	Low	Where the impact affects the heritage resource in such a way that its significance and value are minimally affected.
	Medium	Where the heritage resource is altered, and its significance and value are measurably reduced.
	High	Where the heritage resource is altered or destroyed to the extent that its significance and value cease to exist.
Potential for impact on irreplaceable resources	Low	No irreplaceable resources will be impacted.
	Medium	Resources that will be impacted can be replaced, with effort.
	High	There is no potential for replacing a particularly vulnerable resource that will be impacted.
Consequence, (a combination of extent, duration, intensity, and the potential for impact on irreplaceable resources).	Low	A combination of any of the following: - Intensity, duration, extent and impact on irreplaceable resources are all rated low. - Intensity is low and up to two of the other criteria are rated medium. - Intensity is medium, and all three other criteria are rated low.
	Medium	Intensity is medium, and at least two of the other criteria are rated medium.
	High	Intensity and impact on irreplaceable resources are rated high, with any combination of extent and duration. Intensity is rated high, with all the other criteria being rated medium or higher.
Probability (the likelihood of the impact occurring)	Low	It is highly unlikely or less than 50 % likely that an impact will occur.
	Medium	It is between 50 and 70 % certain that the impact will occur.

Criteria	Rating Scales	Notes
	High	It is more than 75 % certain that the impact will occur, or it is definite that the impact will occur.
Significance (all impacts including potential cumulative impacts)	Low	Low consequence and low probability.
		Low consequence and medium probability.
		Low consequence and high probability.
	Medium	Medium consequence and low probability.
Medium consequence and medium probability.		
Medium consequence and high probability.		
High consequence and low probability.		
High	High consequence and medium probability.	
	High consequence and high probability.	

APPENDIX B

Fieldnotes



FIELD NOTES

Phase 1 Archaeological/Heritage Impact Assessment

Site ID: The proposed development of a 132 kV powerline from Emil substation to Olifantshoek town in the Gamagara Local Municipality and within the John Taolo Gaetsewe District Municipality in the Northern Cape Province.

Phase 1 survey conducted				
CRM Archaeologist	Jan Engelbrecht		Date/s	2020-02-06 To 2020-02-08
Additional surveyors	N. Titus.			
Type of survey	Pedestrian/Vehicular		Transects	30m to 50m where possible
Technical equipment	GPS	Etracks 10 Garmin Hisense Mobile Locus maps	Camera	Canon IXUS Digital Camera

Technical information

Project description	
Project name	The proposed development of a 132kV powerline from Emil substation to Olifantshoek in the Gamagara local municipality and within the John Taolo Gaetsewe District municipality in the Northern Cape Province.
Description	The Gamagara Local Municipality proposes the construction and operation of a grid connection infrastructure between the existing Emil Substation and the soon-to-be constructed Olifantshoek Substation near the town of Olifantshoek in the Northern Cape Province. The grid infrastructure will be used to strengthen the grid network in the area to ensure an adequate supply of electricity for the residents within the Municipality's jurisdictional area. The grid connection infrastructure will only include a single circuit power line with The capacity of up to 132kV. The power line is being assessed within a 300m wide and 36km long corridor which will allow for the optimisation of the infrastructure to be developed and to avoid identified environmental sensitivities. The height of the power line pylons will be up to 20m. The servitude of the power line will be 31m in width.
Developer	
Gamagara Local Municipality	
Contact information	053 723 6000
Development type	Powerline
Landowner	
Contact information	Various (See contact list)
Consultants	

Environmental	Savannah Environmental
Heritage and archaeological	UBIQUE Heritage Consultants
Paleontological	N/A
Property details	
Province	Northern Cape
District municipality	John Taolo Gaetsewe
Local municipality	Gamagara
Topo-cadastral map	1:50 000 2720DD
Farm name	The grid connection corridor traverses the following affected properties: Remaining Extent of the Farm Fritz 540, Portion 1 of the Farm Fritz 540, Portion 2 of the Farm Fritz 540, Portion 4 of the Farm Fritz 540, Portion 5 of the Farm Fritz 540, Portion 10 of the Farm Fritz 540, Remaining Extent of the Farm Gamagara 541, Portion 1 of the Farm Gamagara 541, Portion 7 of the Farm Gamagara 541, Portion 2 of the Farm Dingle 565, Remaining Extent of the Farm Dingle 565, Remaining Extent of the Farm Smythe 566, Remaining Extent of the Farm Murray 570, Portion 2 of the Farm Murray 570, Remaining Extent of the Farm Cox 571, Portion 1 of the Farm Cox 571, Portion 3 of the Farm Cox 571, Portion 4 of the Farm Cox 571, Remaining Extent of the Farm Hartley 573, Remaining Extent of the Farm Diegaart's Heuwel 765, Portion 1 of the Farm Neylan 574
Closest town	Olifantshoek and Kathu
GPS Co-ordinates	27° 55'52.67"S 22° 44'55.33"E
Property size	10ha
Development footprint size	Approximately 10-20ha
Land use	
Previous	Agriculture
Current	Agriculture
Rezoning required	No
Sub-division of land	No
Development criteria in terms of Section 38(1) NHRA	
	Yes/No
Construction of a road, wall, power line, pipeline, canal or other linear form of development or barrier exceeding 300m in length.	Yes
Construction of bridge or similar structure exceeding 50m in length.	No
Construction exceeding 5000m ² .	Yes
Development involving three or more existing erven or subdivisions.	No
Development involving three or more erven or divisions that have been consolidated within the past five years.	No
Rezoning of site exceeding 10 000m ² .	No
Any other development category, public open space, squares, parks, recreation grounds.	No

Site description

Description of the general area affected by development	
Type of environment	Typical Kalahari arid landscape
Terrain description	Typical Kalahari arid landscape with flat sandy areas, minor dunes, klipveld, rocky outcrops and surrounding mountainous areas. Mountainous areas especially towards Olifantshoek town and along the N14 National road from Olifantshoek towards Kathu located to the south of the N14.

Geology	
The terrain varies between Quartzite, Quartz, Dolomite and Calcrete visible on the surface. There are several Dolomite outcrops on the landscape. The klipveld consist mostly of Dolomite and quartzite with BIF to a lesser degree. Mostly igneous stones, shale and calcrete sedimentary rocks.	
Vegetation	
The site footprint is covered by various types of vegetation: Camel Thorn trees (<i>Acacia erioloba</i>), Black Thorn trees (<i>Acacia mellifera</i>), Three Thorn/Driedoring (<i>Rhigozum trichotomum</i>), Skaapbossie (<i>Aizoon schellenbergii</i>), Shepherd tree (<i>Boscia albitrunca</i>), Suurgras (<i>Enneapogon desvauxii</i>), Tall Bushman grass (<i>Stipagrostis hirtigluma</i>), Silky Bushman grass (<i>Stipagrostis uniplumis</i>), Kortbeen Boesmangras (<i>Stipagrostis obtuse</i>), Pencil milk bush (<i>Euphorbia lignose</i>) and Hereroland aloe (<i>Aloe hereroensis</i>).	
Waterways/sources	
Several dry riverine beds are present on the site flowing from north to south and from west to east – no perennial rivers or riverine on site.	
Site boundaries	
North: Bordered by mine activities (Khumani/Sishen/Dingleton) mines and the existing Emil Eskom Substation. South: N14 National road and open farmland and agricultural landscape. West: Olifantshoek townscape and mountain range. East: N14 National road and mine activities.	
Site access	GPS Co-ordinates
Access to the proposed powerline site was entered from Olifantshoek town at the location for the new proposed Sub-station at Olifantshoek.	27° 55' 53.6" South 22° 44' 50.5" East
Disturbances	
Natural erosion	
The only natural disturbances detected were the minor dry riverine (non-perennial) flowing in various directions on the site at several areas on the site footprint.	
Human-made	
Existing roads. At the new substation location and near Emil substation several man-made trenches are crossing through the site footprint.	
Notes	
None	

Environmental recording/Panorama

Way point	Site Name	Description	Location	Field rating/ Significance	Photo No.
Site-specific points of interest/ natural significance					
001	OFH 01	The entry point to the site.	27° 55' 53.6" South 22° 44' 50.5" East	N/A	N/A
N/A	N/A	Contextual images/panorama view of the location of a proposed new substation at Olifantshoek.	N/A	N/A	09-17
004	OFH 04	A sizeable human-made furrow is running through the site, orientation north to south.	27° 55' 54.2" South 22° 45' 05.4" East	N/A	23-24
005	OFH 05	Existing Eskom power line running through the site, orientation NE to SW.	27° 55' 48.8" South 22° 45' 06.6" East	N/A	25-27
N/A	N/A	Access road towards proposed sub-station at Olifantshoek and contextual/panorama view images.	N/A	N/A	28-34

N/A	N/A	Contextual images/panorama view of site footprint along the N14 National road from Oloifantshoek, south of the N14. Images were taken towards various directions NE-SW.	N/A	N/A	52-74
015	OFH 010	A recently disturbed area in the vicinity of the development footprint. Possible abandoned construction camp.	27° 55' 45.4" South 22° 45' 25.8" East	N/A	75-79
016	OFH 011	Existing Emil sub-station.	27° 44' 10.0" South 22° 55' 12.8" East	N/A	80-83
N/A	N/A	Contextual images/panorama view of site footprint south of existing Emil sub-station. Existing Eskom powerline and previously disturbed areas such as trenches.	N/A	N/A	84-90
N/A	N/A	Contextual images/ panorama view of the site footprint on the farm "Murray" with existing powerline present nearby.	N/A	N/A	91-95
N/A	N/A	Contextual images/panorama view of site footprint on "Murray" farm.	N/A	N/A	104-106
018	OFH 013	Small substation near the site footprint.	27° 48' 55.1" South 22° 56' 53.2" East	N/A	110-111
N/A	N/A	Contextual images/panorama view of site footprint west and south of Sishen mine.	N/A	N/A	112-116

Heritage recording

STONE AGE

Way Point Site No.	Photo No.	Description	Period	Location	Field rating/ Significance
HERITAGE FINDS ON PIPELINE DEVELOPMENT FOOTPRINT					
019 DNG001	Photo: 117-119	Type lithic/s	Bladelet	LSA	27° 49' 37.9" South 22° 56' 29.3" East
		Raw material	CCS		
		N in m ² .	1/ 100sqm		
		Context	None/random		
		Additional	LSA bladelet		
					IIIC/NCW

HISTORICAL /COLONIAL FINDS

Waypoint And Site No.	Photo No.	Description	Period	Location	Field Rating
003 NLN001	18-22	Collapsed stone wall orientation east to west. Approximately 100m in length. Possible fencing wall, linear without any angles or kraal shaped.	1900's	27° 55' 54.6" South 22° 45' 03.6" East	IIIC/NCW
017 MRR001	96-103 As well as 107-109	Colonial/historical settlement ca. 1910-1950. Next to water source (fountains). Evidence of stone walls, crib, possible kraal, old Fig tree (<i>Ficus carica</i>) and material culture such as glass, ceramics and metal objects. Multiple occupations are evident. Disturbed by natural erosion.	Ca 1910 to 1950>	27° 53' 58.7" South 22° 51' 00.0" East	IIIC

GRAVES

Waypoint And Site No.	Photo No.	Description	Period	Location	Field Rating
002 NLN002	01-08	Two unmarked graves in the vicinity of proposed new sub-station at Olifantshoek.	Historical	27° 55' 52.6" South 22° 44' 51.4" East	IIIA
006 OFH 06	35-38	Welgelee informal settlement official municipal cemetery.	Historical	27° 56' 01.9" South 22° 45' 07.6" East	IIIA
007 OFH 07	39-43	Ditloug informal settlement official municipal cemetery.	Historical	27° 56' 22.0" South 22° 45' 01.0" East	IIIA
008 OFH 08	44-47	Diepkloof informal settlement official municipal cemetery.	Historical	27° 57' 31.7" South 22° 44' 51.2" East	IIIA
009 OFH 09	48-51	Olifantshoek town official municipal cemetery.	Historical	27° 56' 44.9" South 22° 44' 07.9" East	IIIA
020 MRR002	122-131	Two unmarked graves on "Murray" farm. Possibly older than 100 years. Soldered tin and ammunition rest found in context with the burials.	Ca. 1890>	27° 53' 50.2" South 22° 51' 18.4" East	IIIA

Discussion

Stone Age finds
Stone age material was very scarce, and no artefacts were recorded except for one LSA bladelet/trimmed flake. Higher concentrations of Stone Age (predominantly ESA/MSA) material are located at Kathu Pan and surrounding areas. The presence of subsurface Stone Age material is always possible, but during our survey, no stone tools or the like were located on the surface of the ground.

Historical finds
An interesting Historical occupation site was discovered at a location with two fountains on Murray farm. Cultural material resembles such material found at other Historical sites throughout RSA and can relatively be dated to 1890, 1910 and later. It is a high possibility that this site had multiple occupations and that it served as a livestock post/overnight camp while moving with the stock between farms or regions. It might even have served as a source of water during the ABW. The site has however been disturbed during the recent past.
Identified graves
Official municipal cemeteries were recorded. Two unmarked graves at Olifantshoek close to the proposed Olifantshoek substation were identified which is of high significance. Another two unmarked graves on Murray farm were identified and is similarly of high relevance. The graves on Murray farm are however not located on, or very near the site footprint and they are relatively safe from construction.

Recommendation

Stone Age finds
The project can continue. Only one find of field rating Grade IIIC/NCW significance. Sufficiently recorded during Phase 1. No further action.
Historical finds
The project can continue. It is sufficiently recorded during Phase 1 – no further action.
Identified graves
With regards to all identified graves, especially graves located close to the site footprint: a 50m buffer zone should apply around said graves and graves should be fenced off and identified to prevent accidental construction damage. All legislation will apply to ensure the safety of graves and the developer must comply. The project can continue following existing legislation on burials.
Other
None

Additional notes

Access to the various farms was challenging due to locked gates by farmers and/or Eskom. Contact details provided for farmers to assist us is not always successful because several farmers do not reside on the farms but live in other towns such as Schweizer-Reneke and even Cape Town. Some farmers are not available on their mobile phones due to poor, or no signal as well as general negativity towards Eskom and other Government developments on their farms. Farmers generally are reluctant to assist due to previous Eskom projects where such projects left much damage on the farms and due to non-payments of compensation previously promised by Eskom. I recommend that an Eskom or municipal official (with the necessary keys to open locks) to be present in future projects of this nature, to ensure effective and easier access to our place of work.

Declaration of independence:

I, Jan Engelbrecht, hereby confirm my independence as a heritage specialist and declare that:

- I am suitably qualified and accredited to act as an independent specialist in this application;
- I do not have any vested interests (either business, financial, personal or other) in the proposed development project other than remuneration for the heritage assessment and heritage management services performed;
- the work was conducted in an objective and ethical manner, in accordance with a professional code of conduct and within the framework of South African heritage legislation.



A handwritten signature in black ink, appearing to read 'Jan Engelbrecht'.

Signed:
J.A.C. Engelbrecht

Date: 2020-02-10
UBIQUE Heritage Consultants



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APPENDIX 2: Specialist Desktop Palaeontology Assessment

DESKTOP PALAEOLOGICAL SPECIALIST STUDY

In terms of Section 38(8) of the NHRA

Proposed development of a 132kV powerline near Olifantshoek,
Northern Cape

Prepared by

Dr K. Chapelle

and



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In Association with

Savannah Environmental Services

February 2020



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THE INDEPENDENT PERSON WHO COMPILED A SPECIALIST REPORT OR UNDERTOOK A SPECIALIST PROCESS

I, Dr Kimberley E. J. Chapelle, as the appointed independent specialist hereby declare that I:

- act/ed as the independent specialist in this application;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- have and will not have no vested interest in the proposed activity proceeding;
- have disclosed, to the applicant, EAP and competent authority, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations, 2010 (specifically in terms of regulation 17 of GN No. R. 543) and any specific environmental management Act, and that failure to comply with these requirements may constitute and result in disqualification;
- have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
- have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
- have ensured that the names of all interested and affected parties that participated in terms of the specialist input/study were recorded in the register of interested and affected parties who participated in the public participation process;
- have provided the competent authority with access to all information at my disposal regarding the application, whether such information is favorable to the applicant or not; and
- am aware that a false declaration is an offence in terms of regulation 71 of GN No. R. 543.

Signed:

Name: Dr Kimberley E. J. Chapelle

Date: 11/02/2020



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EXECUTIVE SUMMARY

The Gamagara Local Municipality proposes the construction and operation of a grid connection infrastructure between the existing Elim Substation and the soon-to-be constructed Olifantshoek Substation near the town of Olifantshoek in the Northern Cape Province. The grid infrastructure will be used to strengthen the grid network in the area in order to ensure an adequate supply of electricity for the residents within the Municipality's jurisdictional area.

The proposed powerline is mainly underlain by the Kalahari Group sands and calcretes as well as the Ongeluk Formation volcanic rocks. The powerline does however also traverse small exposures of Voëlwater Formation, Lucknow Formation and Hartley Formation volcanic rocks.

Based on the geology of the proposed development area as well as the current palaeontological record, it is anticipated that the impact of the development will mainly be LOW to MODERATE. However, the north-east section of the power line traversing the Kalahari Group deposits may have HIGH impact due to the close proximity of the Kathu Pan deposits.

Based on the geology and fossil record, a field scoping study is recommended in the Kalahari Group deposits , specifically the surface limestones, before excavation takes place in order to confirm the absence of Kathu Pan-like deposits that may contain Pleistocene fossil faunal assemblages.

For the remainder of the power line, there is very little chance of significant fossil finds being made. Any fossil finds (in stromatolitic Mooidraai and Lucknow formations) are to be reported by the developer. Should important fossil material be found during excavations, the attached Fossil Finds Procedure must be implemented (Appendix 1).



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1. INTRODUCTION

1.1 Background Information on Project

The Gamagara Local Municipality proposes the construction and operation of a grid connection infrastructure between the existing Elim Substation and the soon-to-be constructed Olifantshoek Substation near the town of Olifantshoek in the Northern Cape Province. The grid infrastructure will be used to strengthen the grid network in the area in order to ensure an adequate supply of electricity for the residents within the Municipality's jurisdictional area.

The grid connection infrastructure will only include a single circuit power line with capacity of up to 132kV. The power line is being assessed within a 300m wide and 36km long corridor which will allow for the optimisation of the infrastructure to be developed and to avoid identified environmental sensitivities. The height of the power line pylons will be up to 20m. The servitude of the power line will be 31m in width.

The grid connection corridor traverses the following affected properties, namely:

- » Remaining Extent of the Farm Fritz 540
- » Portion 1 of the Farm Fritz 540
- » Portion 2 of the Farm Fritz 540
- » Portion 4 of the Farm Fritz 540
- » Portion 5 of the Farm Fritz 540
- » Portion 10 of the Farm Fritz 540
- » Remaining Extent of the Farm Gamagara 541
- » Portion 1 of the Farm Gamagara 541
- » Portion 7 of the Farm Gamagara 541
- » Portion 2 of the Farm Dingle 565
- » Remaining Extent of the Farm Dingle 565
- » Remaining Extent of the Farm Smythe 566
- » Remaining Extent of the Farm Murray 570
- » Portion 2 of the Farm Murray 570
- » Remaining Extent of the Farm Cox 571
- » Portion 1 of the Farm Cox 571
- » Portion 3 of the Farm Cox 571
- » Portion 4 of the Farm Cox 571
- » Remaining Extent of the Farm Hartley 573
- » Remaining Extent of the Farm Diegaart's Heuwel 765
- » Portion 1 of the Farm Neylan 574



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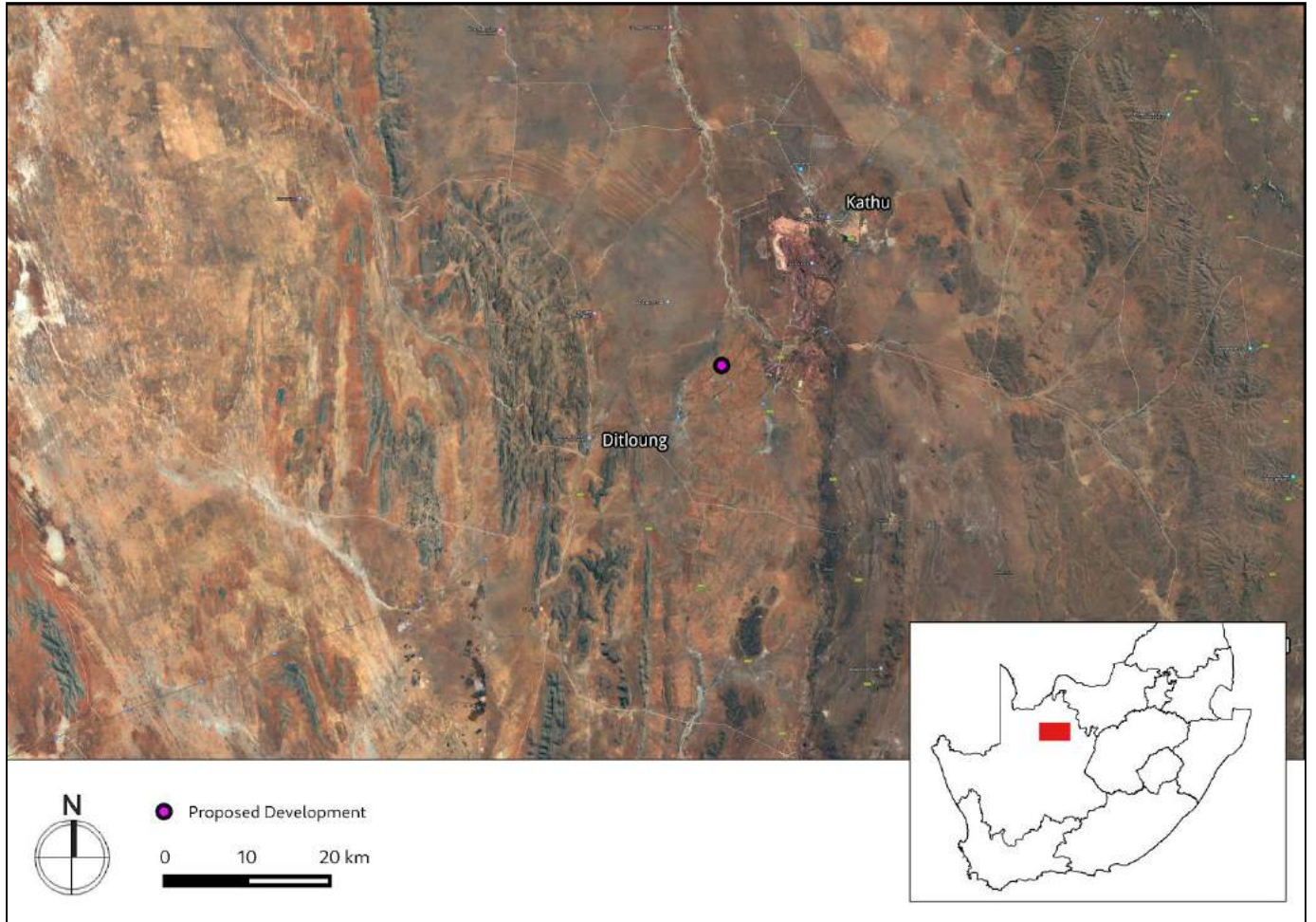


Figure 1: Google Earth© satellite image of the proposed development area



Figure 2: Google Earth© satellite image of the proposed pipelines

2. METHODOLOGY

2.1 Purpose of Palaeontological Study

According to the SAHRA Palaeosensitivity map, the area is underlain by formations of moderate, high and unknown palaeontological significance. However Almond and Pether (2009) describe these specific formations as having a low sensitivity for fossils: both the Hartley and the Lucknow Formations have a low fossil sensitivity, and the sensitivity of the Volwater Formation is unknown. The Gordonia Formation of the Kalahari Group consists of aeolian sands and fossils (bones, teeth, petrified wood, palynomorphs) mainly associated with ancient pans, lakes and river systems, however in a Palaeontological Impact Assessment by Almond (2012, NID 114648), it is stated that “*while a wide spectrum of vertebrate remains, invertebrates, trace fossils, plant fossils and microfossils have been recorded from these Kalahari Group sediments, in general they are of low palaeontological sensitivity and of considerable lateral extent so impacts on fossil heritage here are likely to be of low significance*”. However, due to the high palaeontological sensitivity of some of the sediments underlying the proposed development area, a Desktop Palaeontological Assessment has been completed.



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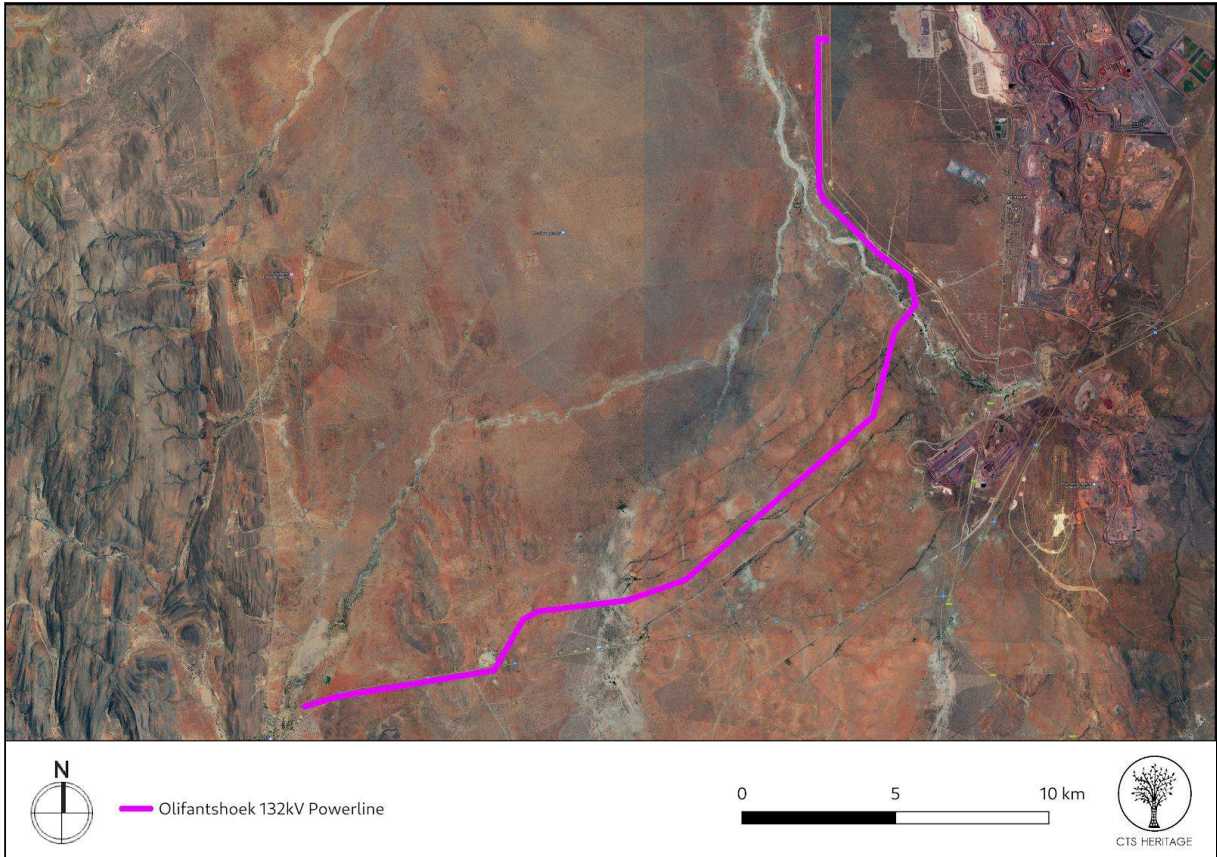


Figure 3: Google Earth© satellite image of the proposed pipelines

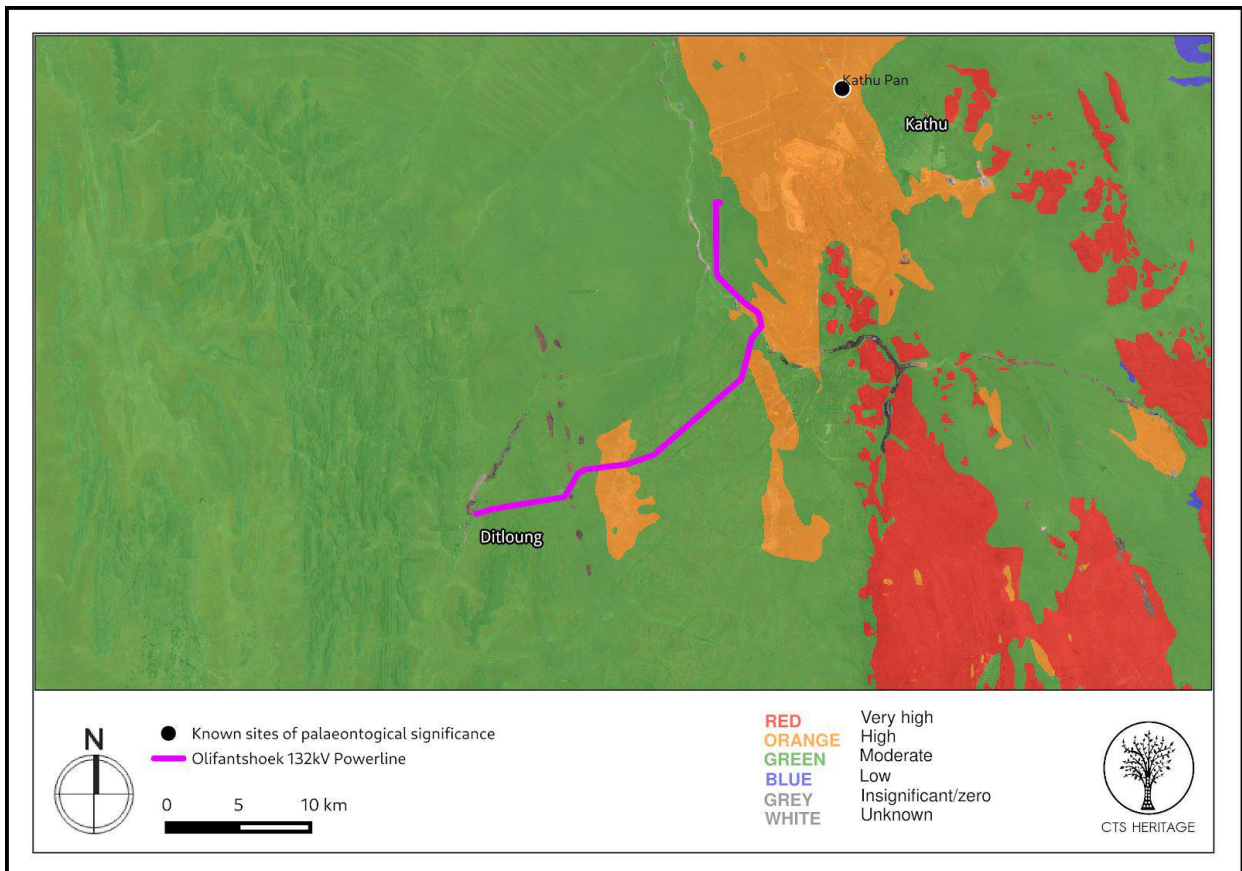


Figure 4: Palaeosensitivity Map. Indicating Unknown to Moderate to High fossil sensitivity underlying the study area.



2.2 Study approach

This Desktop PIA report provides a record of the observed or inferred palaeontological heritage resources within the broader project study area. The identified resources have been assessed to evaluate their heritage significance in terms of the grading system outlined in Section 3 of the NHRA (Act 25 of 1999). Recommendations for specialist palaeontological mitigation are made where this is considered necessary. The report is based on (1) a review of the relevant scientific literature, including previous palaeontological impact assessments in the broader study region published geological maps, project data, Google Earth satellite imagery and accompanying sheet explanations.

3. GEOLOGICAL CONTEXT OF THE STUDY AREA

The proposed powerline is mainly underlain by the Kalahari Group sands and calcretes as well as the Ongeluk Formation volcanic rocks. The powerline does however also traverse small exposures of Voëlwater Formation, Lucknow Formation and Hartley Formation volcanic rocks.

The oldest of these exposures, the Ongeluk Formation (volcanic rocks comprising amygdaloidal andesitic lava with interbeds of tuff, agglomerate, chert and red jasper; 'Vo' on figure 5.2), is part of the Postmasburg Group, which is in turn part of the larger Transvaal Supergroup (Almond and Pether, 2008; De Kock et al., 2019; Johnson et al., 2006). The Postmasburg Group (Early Proterozoic) is thought to be correlated with the lower Pretoria Group and can reach up to 1.5km in thickness. It comprises four formations, with the Ongeluk being the second oldest (ages of 2.43 Ga and 2.2 Ga have been estimated), overlying the Makganyene Formation and underlying the Hotazel Formation. The Ongeluk Formation (500-600m thick) is composed of extrusive tholeiitic basaltic-andesitic lavas that formed as part of a larger flood-basalt volcanic event (Altermann and Hälbig, 1991; Johnson et al., 2006). The depositional environment is believed to vary from subaqueous (pillow lavas, hyaloclastites and massive flows) to subaerial (pipe amygdaloids and flow structures) (Johnson et al., 2006).

On the geological map (figure 5), the Voëlwater Formation (Massive and banded jasper; dolomite and chert; lava; 'Vv' on figure 5.2) overlies the Ongeluk Formation. However, based on recent literature, the Voëlwater is a Subgroup that is also part of the Postmasburg Group and comprises the bottom Hotazel Formation and the top Mooidraai Formation (Grobelaar et al., 1995; Tsikos et al., 2003). The Hotazel Formation is made up of jaspillites and volcanic-exhalative manganese deposits (200-250m thick, exact age speculative, uppermost Paleoproterozoic), whereas the Mooidraai Formation is made up of dolomites (2.4 Ga) (Tsikos et al., 2003).

The Olifantshoek Supergroup overlies the Transvaal Supergroup and can be subdivided into nine formations, the top five of which form the Volop Group. The lower three formations consist of the Mapedi & Gamagara Formation, which is overlaid by the Lucknow Formation, which underlies the Hartley & Boegoeberg Dam Formation (Johnson et al., 2006). The Lucknow Formation (quartzite, subordinate dolomitic limestone and shale; shale, quartzite; volcanic rocks; 'VI' on figure 5.2) is about 500m thick and was deposited between 2.2 and 2.1 Ga (Schröder et al., 2008). It is made up of shales (deposited in open marine environment), micritic and stromatolitic dolostones (deposited in a shallow protected carbonate lagoon environment), wackes (deposited in possibly tidal sand and mud flats), quartz arenites (deposited in fluvio-marine channels) and dolarenites and dolorudites (deposited in fluvio-marine channels) (Schröder et al., 2008).



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The overlying Hartley Formation (Andesitic lava with interbeds of tuff, agglomerate, quartzite and conglomerate; 'Vh' in figure 5.2) is approximately 300m thick, although volcanic beds are present above and beneath it, possibly bringing the thickness up to 762m (Grobbelaar et al., 1995). It consists mainly of basaltic lava, tuffs with interbedded lenses of quartzite, conglomerate as well as rare quartz porphyry deposited 1.9 Ga (Cornell et al., 2016; Johnson et al., 2006). It is believed to have been formed by explosive volcanism in a subaerial environment.

The Olifantshoek Supergroup is progressively covered by the Kalahari Group as it extends towards Korronaberg. The Quaternary red to flesh-coloured wind-blown sands ('Qs' on figure 5.2) and Tertiary surface limestone ('Tl' on figure 5.2) can therefore broadly be correlated with the Gordonia and Mokalanen formations (respectively) of the Kalahari Group (Pether et al., 2018). The Kalahari Group represents the largest Cenozoic (66 mya to 0 mya) terrestrial sediment deposit in southern Africa. It extends uninterrupted from the Northern Cape to 2 degrees north of the equator, and possibly further south in the semi-arid Karoo. The Kalahari Group can reach up to 210m in thickness. The thickest part of the Kalahari overlies the Dwyka Group rocks that may have played a role in the deposition of Kalahari Group sediments (Johnson et al., 2006; Malherbe, 1984). The Mokalanen Formation underlies the outcrop consisting of boulder gravel derived from Dwyka Tillite that is found underneath the Gordonia Formation. The calcretes forming the Mokalanen Formation were deposited between the Pliocene and early Holocene (5.3 mya-0 mya). These comprise sandy limestones and overlying conglomerates with a calcareous matrix. The Mokalanen Formation was deposited under more arid conditions than the underlying fluvial Eden Formation (Johnson et al., 2006). The Gordonia Formation (informally Kalahari sand) is part of the upper Kalahari Group. The former can reach up to 30m in thickness and comprises red aeolian sands, usually deposited on an underlying calcrete surface but can rest directly on pre Kalahari deposits. The sands, composed of rounded quartz grains, owe their red colour to a thin coating of haematite around the grains. The presence of white sand in river bottoms and bottomland areas is due to the lack of haematite. Linear dunes (formed as early as the Late Pliocene or Early Pleistocene, 2.6 mya) make up a lot of the Gordonia Formation.

The Kathu Pan, situated approximately 11km from the North-East end-point of the proposed power line (see figure 4), is located within a marshland and comprises one of the 11 dolines (sinkholes) present within the Tertiary surface limestone deposit (or Mokalanen calcretes) of the Kalahari Group (Porat et al., 2010). These were infilled over time. These dolines represent Pleistocene and Holocene deposits (Porat et al., 2010).



Table 1: Geology and fossil heritage of the proposed Olifantshoek Powerline area, Northern Cape. Palaeontological sensitivity (Almond and Pether (2008) indicated by colour: Red - Very High, Orange - High, Green - Moderate, Blue - Low, Grey - Insignificant, Clear - Unknown)

Geological Unit	Age	Lithology	Symbol Fig. 5	Fossil Heritage	Mitigation
Kalahari Group, Wind-blown sand (Gordonia Formation)	2.6 mya to 0 mya	Informally kalahari sand, red (haematite coated) and white (lacking haematite) aeolian sand, usually deposited on underlying calcrete surface but can rest directly on pre kalahari deposits. 30m thick	Qs	Calcretised insect burrows (including termites) and root casts (rhizoliths), ostrich egg shells (Struthio), shells of land snails (e.g. Trigonephrus), bivalves and gastropods (e.g. Corbula, unio) and ostracods (seed shrimps), charophytes (stonewort algae), diatoms, Stromatolites, mammalian ichnofossils	No action required (any fossil finds to be reported by developer)
Kalahari Group, Surface limestone (Mokalanen Formation)	5.3 mya to 0 mya	Sandy limestones and Overlying conglomerates with a calcareous matrix. 30m Possibility of dolines infilled with Pleistocene and Holocene deposits	TI	Calcretised burrows (including termites), root casts (rhizoliths) as well as Mammalian Ichnofossils. Possible fragmented, mainly dental remains of Pleistocene mammals (including equids, rhinoceros, zebra and bovines).	Field scoping study recommended before excavation takes place
Olifantshoek Supergroup, Hartley Formation	1.9 ga	Basaltic lava, tuffs with Interbedded lenses of Quartzite, conglomerate as well as rare quartz porphyry. 300 to 762m thick	Vh	None	No action required (any fossil finds to be reported by developer)
Olifantshoek Supergroup, Lucknow Formation	Between 2.2 ga and 2.1 ga	Shales (deposited in open marine environment), micritic and stromatolitic Dolostones (deposited in a shallow protected carbonate lagoon environment), wackes (deposited is possibly tidal sand and mud flats), quartz arenites (deposited in fluvio-marine channels) and dolarenites and Dolorudites (deposited in Fluvio-marine channels). 500m thick	VI	Nodular and laminated domal and columnar stromatolites	No action required (any fossil finds to be reported by developer)
Transvaal Supergroup, Postmasburg Group, Voëlwater Subgroup, Mooidraai Formation	2.4 ga	Dolomites	Vv	Smoothly laminated stromatolites	No action required (any fossil finds to be reported by developer)
Transvaal Supergroup, Postmasburg Group,	Paleo-proterozoic	Jaspillites and volcanic-Exhalative manganese deposits. 200-250m thick	Vv	None	No action required (any fossil finds to be reported by developer)



Voëlwater Subgroup, Hotazel Formation					reported by developer)
Transvaal Supergroup, Postmasburg Group, Voëlwater Subgroup, Ongeluk Formation	Between 2.2 ga and 2.43 ga	Extrusive tholeiitic basaltic-andesitic lavas that formed as part of a larger flood-basalt volcanic event. Depositional environment is believed to vary from subaqueous (pillow lavas, Hyaloclastites and massive flows) to subaerial (pipe amygdales and flow structures). 500-600m thick	Vo	2.4 billion year old microscopic (2-12µm wide) Fungus-like mycelial fossils	No action required (any fossil finds to be reported by developer)

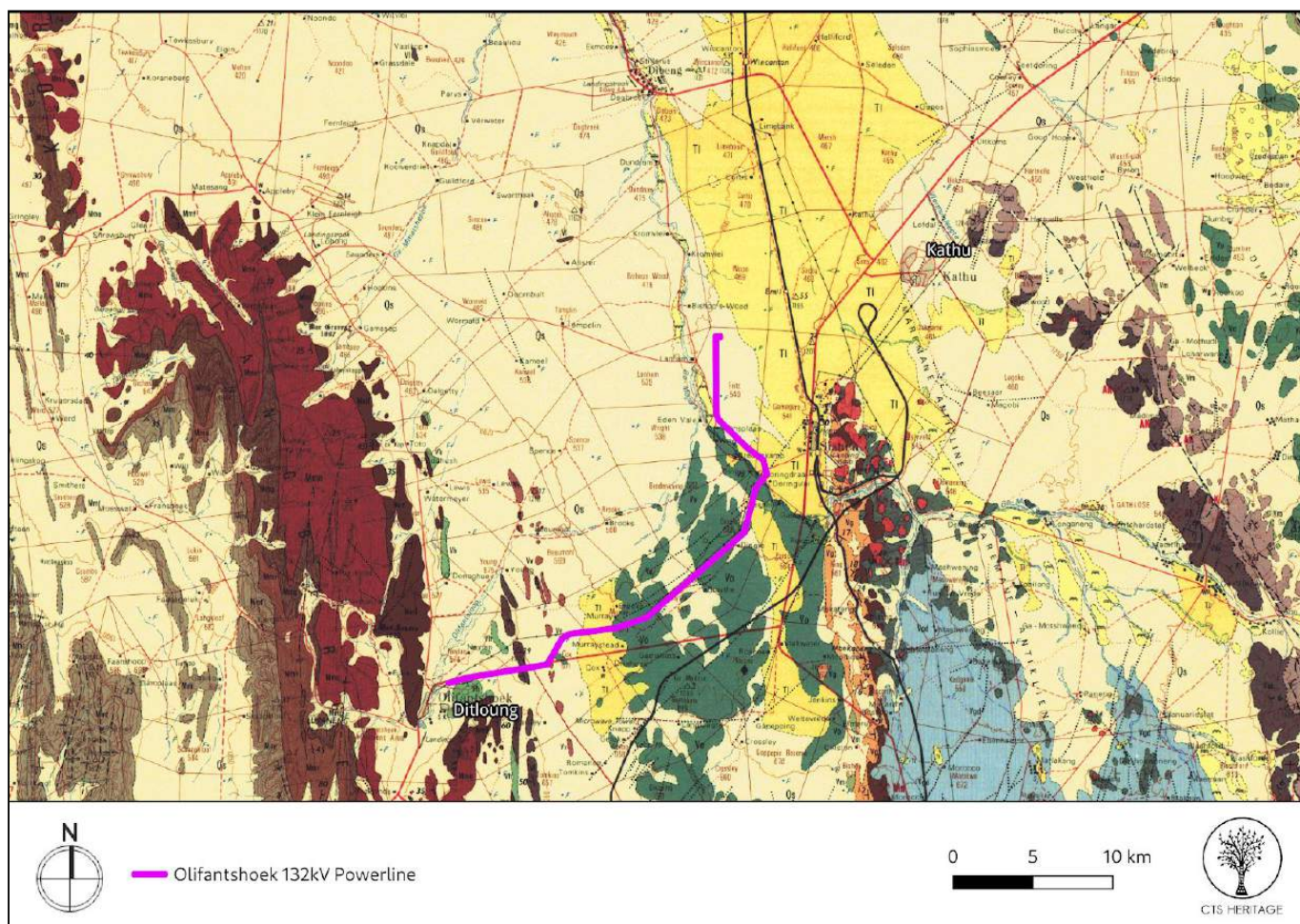


Figure 5.1: Geology Map. Indicating the underlying geology across the study area through overlaying the geology maps from the CGS series 2722 Kuruman (Qs: Quarternary Sands; Tl: Tertiary Surface Limestone; Vh: Hartley Formation volcanic rocks; Vl: Lucknow Formation; Vv: Voelwater Formation; Vo: Ongeluk Formation volcanic rocks)

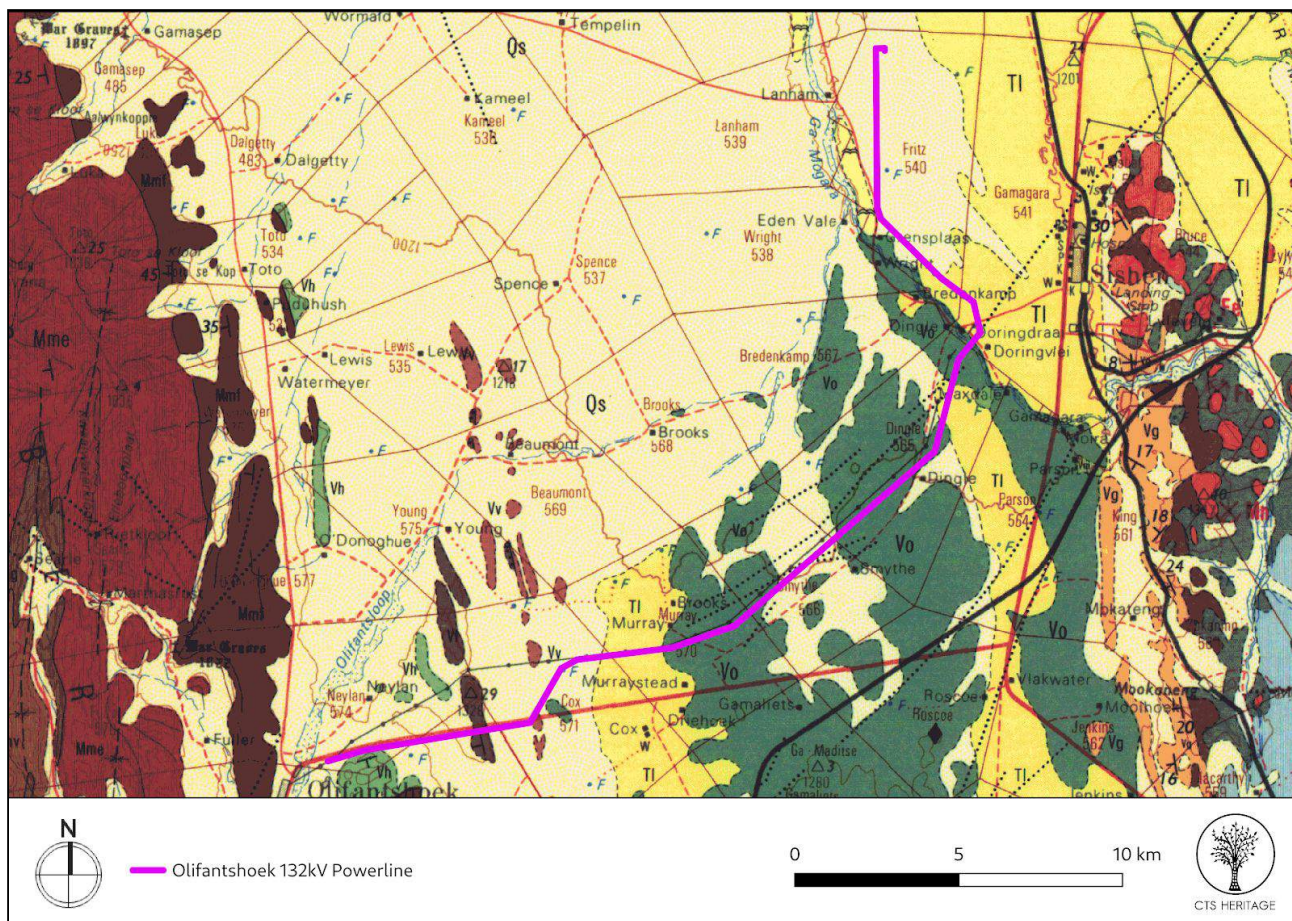


Figure 5.2: Geology Map zoomed in.

4. PALAEOLOGICAL HERITAGE RESOURCES

4.1. Review of regional palaeontology

2.4 billion year old microscopic (2-12µm wide) fungus-like mycelial fossils have been recorded from the Ongeluk basalts (between Kathu and Prieska) (Bengtson et al., 2017). The Mooidraai Formation (Voëlwater Subgroup) preserves stromatolites (Johnson et al., 2006). These smoothly laminated stromatolites are found in the upper Mooidraai Formation in contact with intraclast breccias. They can also be found within microbialaminite packages. The smoothly laminated stromatolites do not usually exceed 30cm in thickness but can reach 1m in thickness (Almond and Pether, 2008; Johnson et al., 2006; Kunzmann et al., 2014). The dolostones of the Lucknow Formation are known to yield nodular and laminated domal and columnar stromatolites (from cm to dm wide) (Schröder et al., 2008).

Although present, the fossil record of the Kalahari Group is sporadic and not very diverse. These fossils are usually associated with ancient pans, lakes and rivers (Almond and Pether, 2008). Aeolian dunes are not likely to preserve fossil material, however, calcretisation in low relief areas may preserve burrows (including termites) and root casts (rhizoliths). Fossils that have been recorded include ostrich egg shells (*Struthio*), shells of land snails (e.g. *Trigonephrus*), bivalves and gastropods (e.g. *Corbula*, *Unio*), ostracods (seed shrimps), charophytes (stonewort algae), diatoms (microscopic algae within siliceous shells) and stromatolites (laminated microbial limestones).



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Kathu Pan, situated approximately 11km from the north-east end-point of the proposed power line (see figure 4), is a significant archaeological site that preserves Early and Middle Stone Age Sequences (Wilkins, 2017). Fragmented, mainly dental, faunal remains have been recorded in several strata of the Kathu Pan sequence (Klein, 1988; Wilkins, 2017). These include remains of equids, rhinoceros, zebra and bovines. These fossils may have accumulated by natural death close to a water source that attracted people, as well as through human activity (Klein, 1988; Porat et al., 2010). The Mokolanen clacretes have also yielded calcretised burrows (including termites), root casts (rhizoliths) as well as mammalian ichnofossils (Almond and Pether, 2008; Malherbe, 1984).

4.2. Summary of palaeontological resources identified in this area

- The volcanic nature of the Ongeluk Formation makes it unlikely that it will yield fossils. Although mycelial fungus-like fossils have been recorded, these are microscopic and came from a site over 100km south of the proposed power line.
- The volcanic nature of the Hotazel Formation (Voëlwater Subgroup) makes it unlikely that it will yield fossils.
- The Moidraai Formation (Voëlwater Subgroup) could preserve stromatolites.
- The dolostones of the Lucknow Formation are known to yield stromatolites (from cm to dm wide).
- The volcanic nature of the Hartley Formation makes it unlikely that it will yield fossils.
- The Kalahari Group has a sparse and poorly diverse fossil record. However, the close proximity of the Kathu Pan deposits (11km) from the north-east terminal point of the proposed power line as well as the fact that the power line traverses the same geological formations as that of the Kathu Pan, make it that there is a possibility of fossil faunal assemblages being present.

5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

Based on the geology of the proposed development area as well as the current palaeontological record, it is anticipated that the impact of the development will mainly be LOW to MODERATE. However, the north-east section of the power line traversing the Kalahari Group deposits may have HIGH impact due to the close proximity of the Kathu Pan deposits.

6. CONCLUSION AND RECOMMENDATIONS

Based on the geology and fossil record, a field scoping study is recommended in the Kalahari Group deposits, specifically the surface limestones, before excavation takes place in order to confirm the absence of Kathu Pan-like deposits that may contain Pleistocene fossil faunal assemblages.

For the remainder of the power line, there is very little chance of significant fossil finds being made. Any fossil finds (in stromatolitic Moidraai and Lucknow formations) are to be reported by the developer. Should important fossil material be found during excavations, the attached Fossil Finds Procedure must be implemented (Appendix 1).



7. REFERENCES

Heritage Impact Assessments				
Nid	Report Type	Author/s	Date	Title
114648	PIA	John E Almond	01/09/2012	Palaeontological specialist assessment: desktop study PROPOSED 16 MTPA EXPANSION OF TRANSNET'S EXISTING MANGANESE ORE EXPORT RAILWAY LINE & ASSOCIATED INFRASTRUCTURE BETWEEN HOTAZEL AND THE PORT OF NGQURA, NORTHERN & EASTERN CAPE. Part 1: Hotazel
151768	PIA	John E Almond	01/11/2013	Palaeontological specialist assessment: combined desktop and field-based study: PROPOSED 16 MTPA EXPANSION OF TRANSNET'S EXISTING MANGANESE ORE EXPORT RAILWAY LINE & ASSOCIATED INFRASTRUCTURE BETWEEN HOTAZEL AND THE PORT OF NGQURA, NORTHERN & EAS

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Klein, R. G. 1988. The archaeological significance of animal bones from Acheulean sites in southern Africa. *African Archaeological Review* 6:3-25.



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Pether, J., P. S. Nat, and M. P. Thukgwi. 2018. Updated palaeontological assessment with revised fossil finds procedure for the EMP. Proposed prospecting on the remaining extent of portion 1 of the farm Viegulands PUT 42, near Prieska, Siyathemba Local Municipality, Prieska Magisterial District, Northern Cape Province.

Porat, N., M. Chazan, R. Grün, M. Aubert, V. Eisenmann, and L. K. Horwitz. 2010. New radiometric ages for the Fauresmith industry from Kathu Pan, southern Africa: Implications for the Earlier to Middle Stone Age transition. *Journal of Archaeological Science* 37:269-283.

Schröder, S., A. Bekker, N. Beukes, H. Strauss, and H. Van Niekerk. 2008. Rise in seawater sulphate concentration associated with the Paleoproterozoic positive carbon isotope excursion: evidence from sulphate evaporites in the 2.2–2.1 Gyr shallow-marine Lucknow Formation, South Africa. *Terra Nova* 20:108-117.

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Appendix 1: Chance Fossil Finds Procedure



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CHANCE FINDS OF PALAEOLOGICAL MATERIAL

(Adopted from the HWC Chance Fossils Finds Procedure: June 2016)

Introduction

This document is aimed to inform workmen and foremen working on a construction and/or mining site. It describes the procedure to follow in instances of accidental discovery of palaeontological material (please see attached poster with descriptions of palaeontological material) during construction/mining activities. This protocol does not apply to resources already identified under an assessment undertaken under s. 38 of the National Heritage Resources Act (no 25 of 1999).

Fossils are rare and irreplaceable. Fossils tell us about the environmental conditions that existed in a specific geographical area millions of years ago. As heritage resources that inform us of the history of a place, fossils are public property that the State is required to manage and conserve on behalf of all the citizens of South Africa. Fossils are therefore protected by the National Heritage Resources Act and are the property of the State. Ideally, a qualified person should be responsible for the recovery of fossils noticed during construction/mining to ensure that all relevant contextual information is recorded.

Heritage Authorities often rely on workmen and foremen to report finds, and thereby contribute to our knowledge of South Africa's past and contribute to its conservation for future generations.

Training

Workmen and foremen need to be trained in the procedure to follow in instances of accidental discovery of fossil material, in a similar way to the Health and Safety protocol. A brief introduction to the process to follow in the event of possible accidental discovery of fossils should be conducted by the designated Environmental Control Officer (ECO) for the project, or the foreman or site agent in the absence of the ECO. It is recommended that copies of the attached poster and procedure are printed out and displayed at the site office so that workmen may familiarise themselves with them and are thereby prepared in the event that accidental discovery of fossil material takes place.

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Actions to be taken

One person in the staff must be identified and appointed as responsible for the implementation of the attached protocol in instances of accidental fossil discovery and must report to the ECO or site agent. If the ECO or site agent is not present on site, then the responsible person on site should follow the protocol correctly in order to not jeopardize the conservation and well-being of the fossil material.

Once a workman notices possible fossil material, he/she should report this to the ECO or site agent. Procedure to follow if it is likely that the material identified is a fossil:

- The ECO or site agent must ensure that all work ceases immediately in the vicinity of the area where the fossil or fossils have been found;
- The ECO or site agent must inform SAHRA of the find immediately. This information must include photographs of the findings and GPS co-ordinates;
- The ECO or site agent must compile a Preliminary Report and fill in the attached Fossil Discoveries: Preliminary Record Form within 24 hours without removing the fossil from its original position. The Preliminary Report records basic information about the find including:
 - The date
 - A description of the discovery
 - A description of the fossil and its context (e.g. position and depth of find)
 - Where and how the find has been stored
 - Photographs to accompany the preliminary report (the more the better):
 - A scale must be used
 - Photos of location from several angles
 - Photos of vertical section should be provided
 - Digital images of hole showing vertical section (side);
 - Digital images of fossil or fossils.

Upon receipt of this Preliminary Report, SAHRA will inform the ECO or site agent whether or not a rescue excavation or rescue collection by a palaeontologist is necessary.



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- Exposed finds must be stabilised where they are unstable and the site capped, e.g. with a plastic sheet or sand bags. This protection should allow for the later excavation of the finds with due scientific care and diligence. SAHRA can advise on the most appropriate method for stabilisation.
- If the find cannot be stabilised, the fossil may be collect with extreme care by the ECO or the site agent and put aside and protected until SAHRA advises on further action. Finds collected in this way must be safely and securely stored in tissue paper and an appropriate box. Care must be taken to remove the all fossil material and any breakage of fossil material must be avoided at all costs.

No work may continue in the vicinity of the find until SAHRA has indicated, in writing, that it is appropriate to proceed.

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FOSSIL DISCOVERIES: PRELIMINARY RECORDING FORM		
Name of project:		
Name of fossil location:		
Date of discovery:		
Description of situation in which the fossil was found:		
Description of context in which the fossil was found:		
Description and condition of fossil identified:		
GPS coordinates:	<i>Lat:</i>	<i>Long:</i>
If no co-ordinates available then please describe the location:		
Time of discovery:		
Depth of find in hole		
Photographs (tick as appropriate and indicate number of the photograph)	<i>Digital image of vertical section (side)</i>	
	<i>Fossil from different angles</i>	
	<i>Wider context of the find</i>	
Temporary storage (where it is located and how it is conserved)		
Person identifying the fossil Name:		
Contact:		
Recorder Name:		
Contact:		
Photographer Name:		
Contact:		

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APPENDIX 3: Desktop Heritage Screening Assessment



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HERITAGE SCREENER

CTS Reference Number:	CTS19_190
SAHRIS Ref:	TBA
Client:	Savannah
Date:	17 January 2020
Title:	Proposed development of a 132kV powerline near Olifantshoek, Northern Cape

Figure 1a. Satellite map indicating the location of the proposed development in the Northern Cape Province

Recommendation by CTS Heritage Specialists	RECOMMENDATION: As it is likely that any proposed development will impact significant heritage resources, it is recommended that a Heritage Impact Assessment be conducted that assesses impacts to archaeological and palaeontological heritage resources.
--	--

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1. Proposed Development Summary

The Gamagara Local Municipality proposes the construction and operation of a grid connection infrastructure between the existing Elim Substation and the soon-to-be constructed Olifantshoek Substation near the town of Olifantshoek in the Northern Cape Province. The grid infrastructure will be used to strengthen the grid network in the area in order to ensure an adequate supply of electricity for the residents within the Municipality's jurisdictional area. The grid connection infrastructure will only include a single circuit power line with capacity of up to 132kV. The power line is being assessed within a 300m wide and 36km long corridor which will allow for the optimisation of the infrastructure to be developed and to avoid identified environmental sensitivities. The height of the power line pylons will be up to 20m. The servitude of the power line will be 31m in width.

2. Application References

Name of relevant heritage authority(s)	SAHRA
Name of decision making authority(s)	DEA

3. Property Information

Latitude / Longitude	27°55'52.67"S 22°44'55.33"E
Erf number / Farm number	The grid connection corridor traverses the following affected properties: Remaining Extent of the Farm Fritz 540, Portion 1 of the Farm Fritz 540, Portion 2 of the Farm Fritz 540, Portion 4 of the Farm Fritz 540, Portion 5 of the Farm Fritz 540, Portion 10 of the Farm Fritz 540, Remaining Extent of the Farm Gamagara 541, Portion 1 of the Farm Gamagara 541, Portion 7 of the Farm Gamagara 541, Portion 2 of the Farm Dingle 565, Remaining Extent of the Farm Dingle 565, Remaining Extent of the Farm Smythe 566, Remaining Extent of the Farm Murray 570, Portion 2 of the Farm Murray 570, Remaining Extent of the Farm Cox 571, Portion 1 of the Farm Cox 571, Portion 3 of the Farm Cox 571, Portion 4 of the Farm Cox 571, Remaining Extent of the Farm Hartley 573, Remaining Extent of the Farm Diegaart's Heuwel 765, Portion 1 of the Farm Neylan 574
Local Municipality	Gamagara
District Municipality	Kgalagadi
Previous Magisterial District	Postmasburg
Province	Northern Cape
Current Use	Agriculture - The land use of the properties affected by the proposed power line includes agriculture, conservation and mining-related activities.
Current Zoning	Agriculture

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4. Nature of the Proposed Development

Total Surface Area	300m wide and 36km long corridor
Depth of excavation (m)	Up to 3m
Height of development (m)	Up to 20m

5. Category of Development

x	Triggers: Section 38(8) of the National Heritage Resources Act
	Triggers: Section 38(1) of the National Heritage Resources Act
x	1. Construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier over 300m in length.
	2. Construction of a bridge or similar structure exceeding 50m in length.
	3. Any development or activity that will change the character of a site-
	a) exceeding 5 000m ² in extent
	b) involving three or more existing erven or subdivisions thereof
	c) involving three or more erven or divisions thereof which have been consolidated within the past five years
	4. Rezoning of a site exceeding 10 000m ²
	5. Other (state):

6. Additional Infrastructure Required for this Development

NA

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7. Mapping (please see Appendix 3 and 4 for a full description of our methodology and map legends)

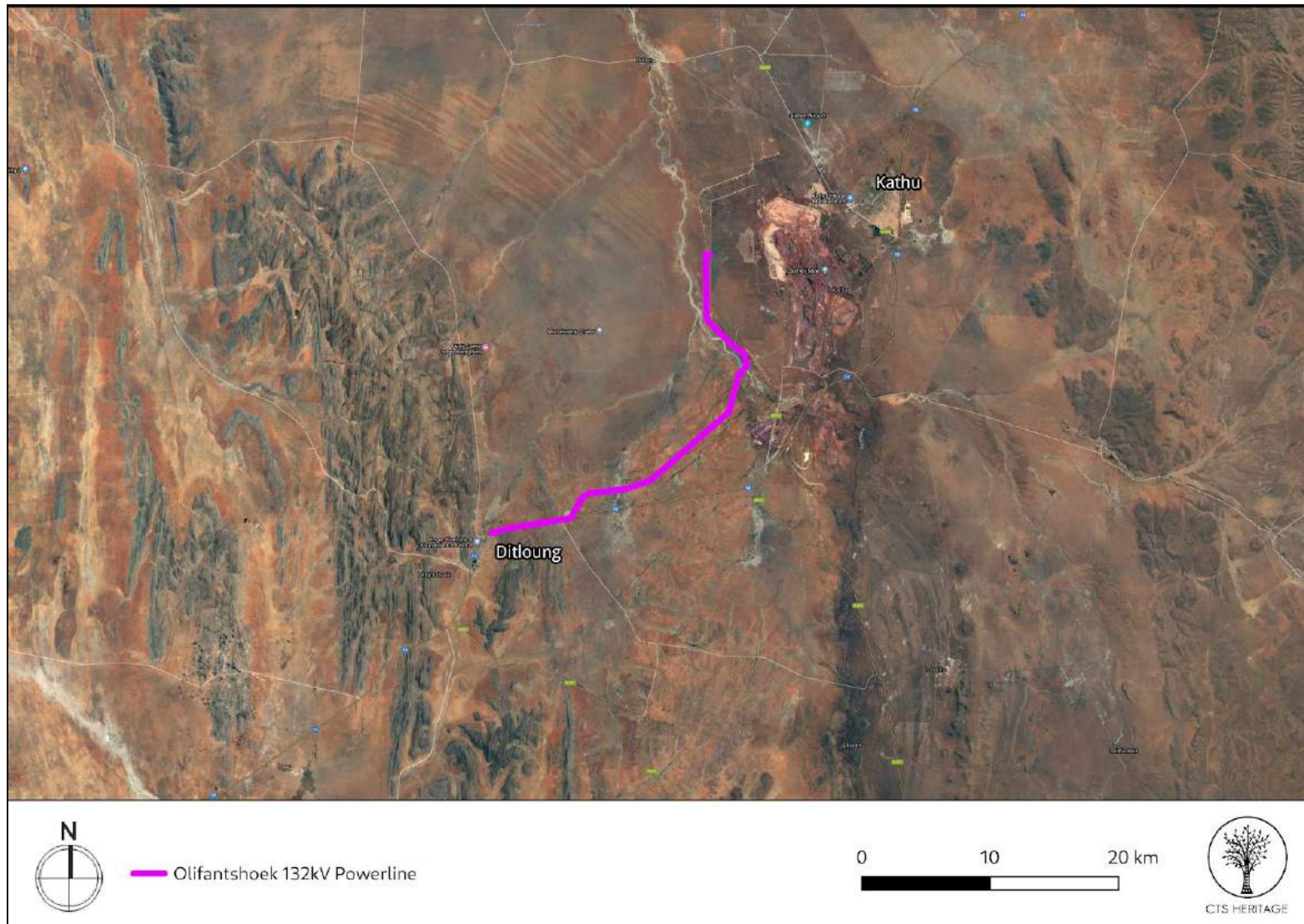


Figure 1b. Overview Map. Satellite image (2019) indicating the proposed development area at closer range.

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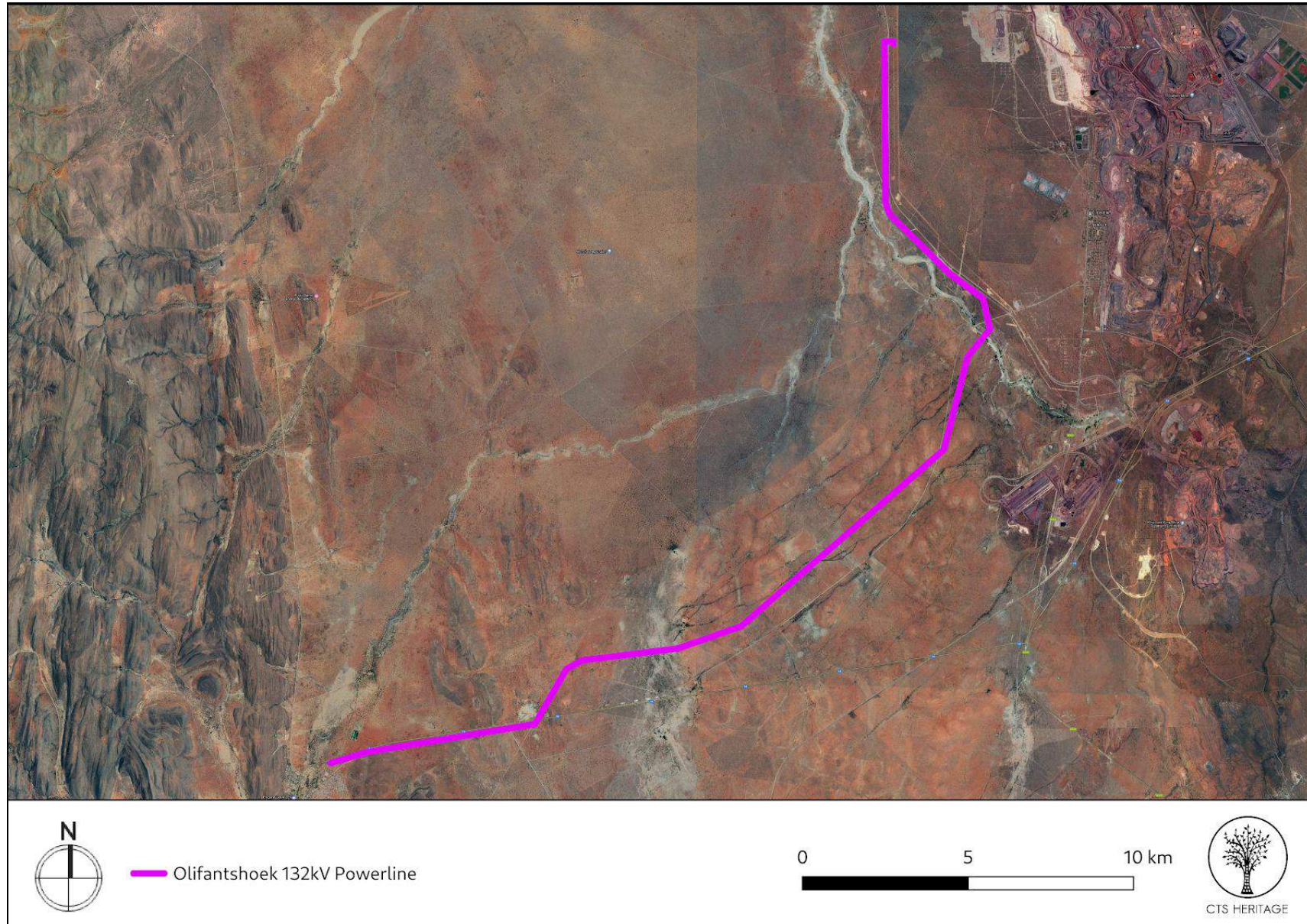


Figure 1c. Overview Map. Satellite image (2019) indicating the proposed development area at closer range.

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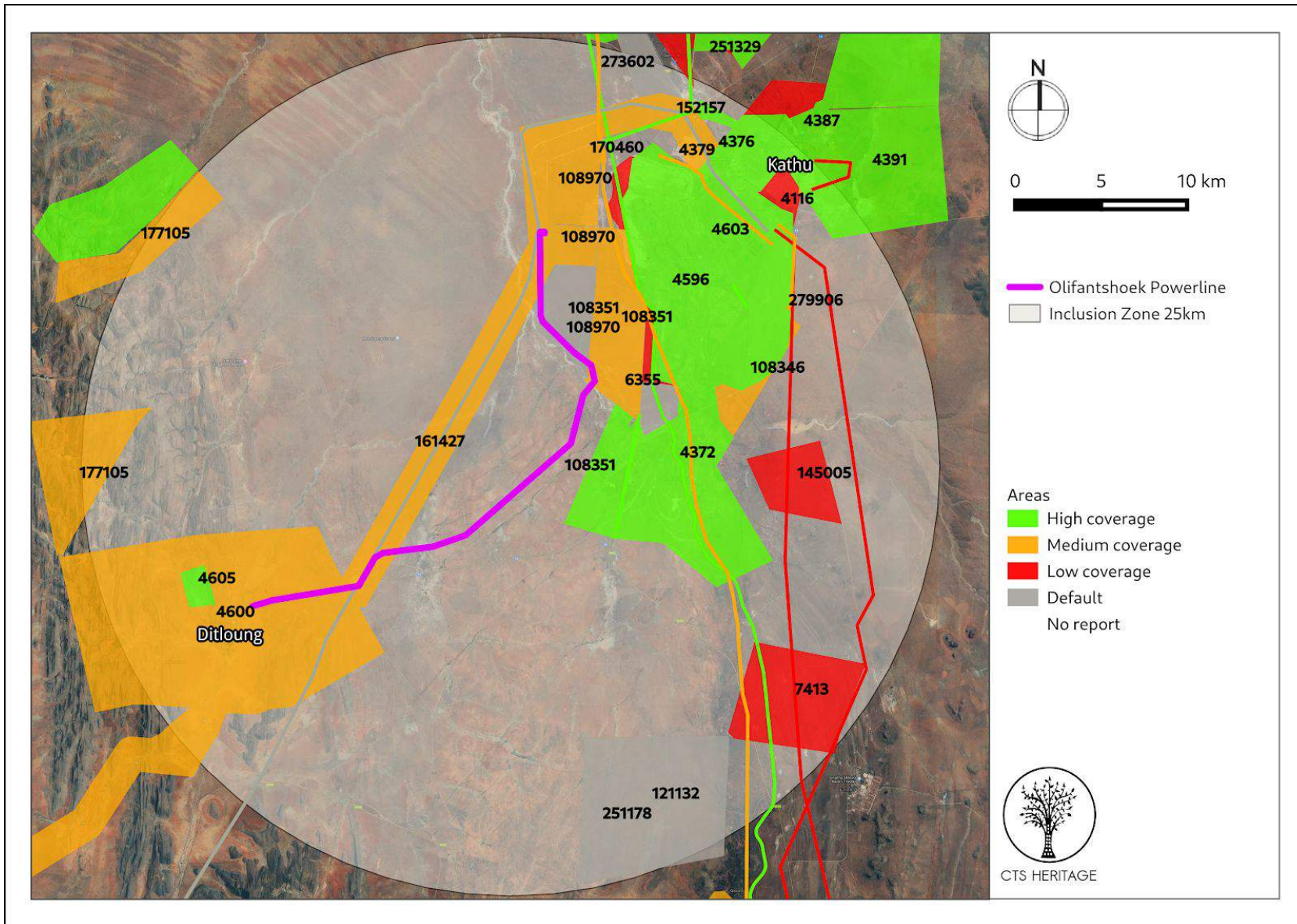


Figure 2. Previous HIAs Map. Previous Heritage Impact Assessments surrounding the proposed development area within 5km, with SAHRIS NIDS indicated. Please see Appendix 2 for full reference list.

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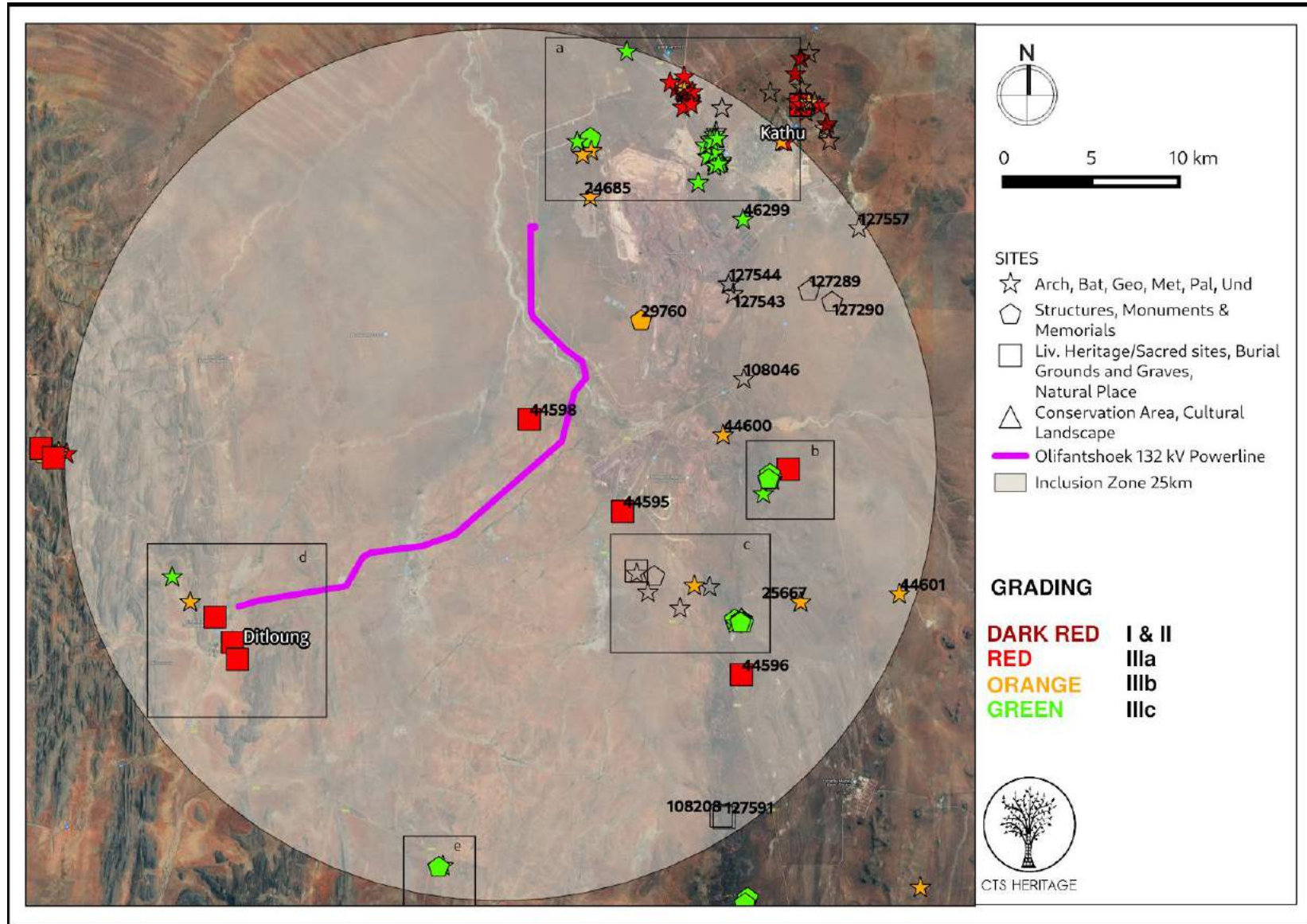


Figure 3. Heritage Resources Map. Heritage Resources previously identified in and near the study area. See insets a to d below with SAHRIS Site IDs indicated. Please See Appendix 4 for full description of heritage resource types.

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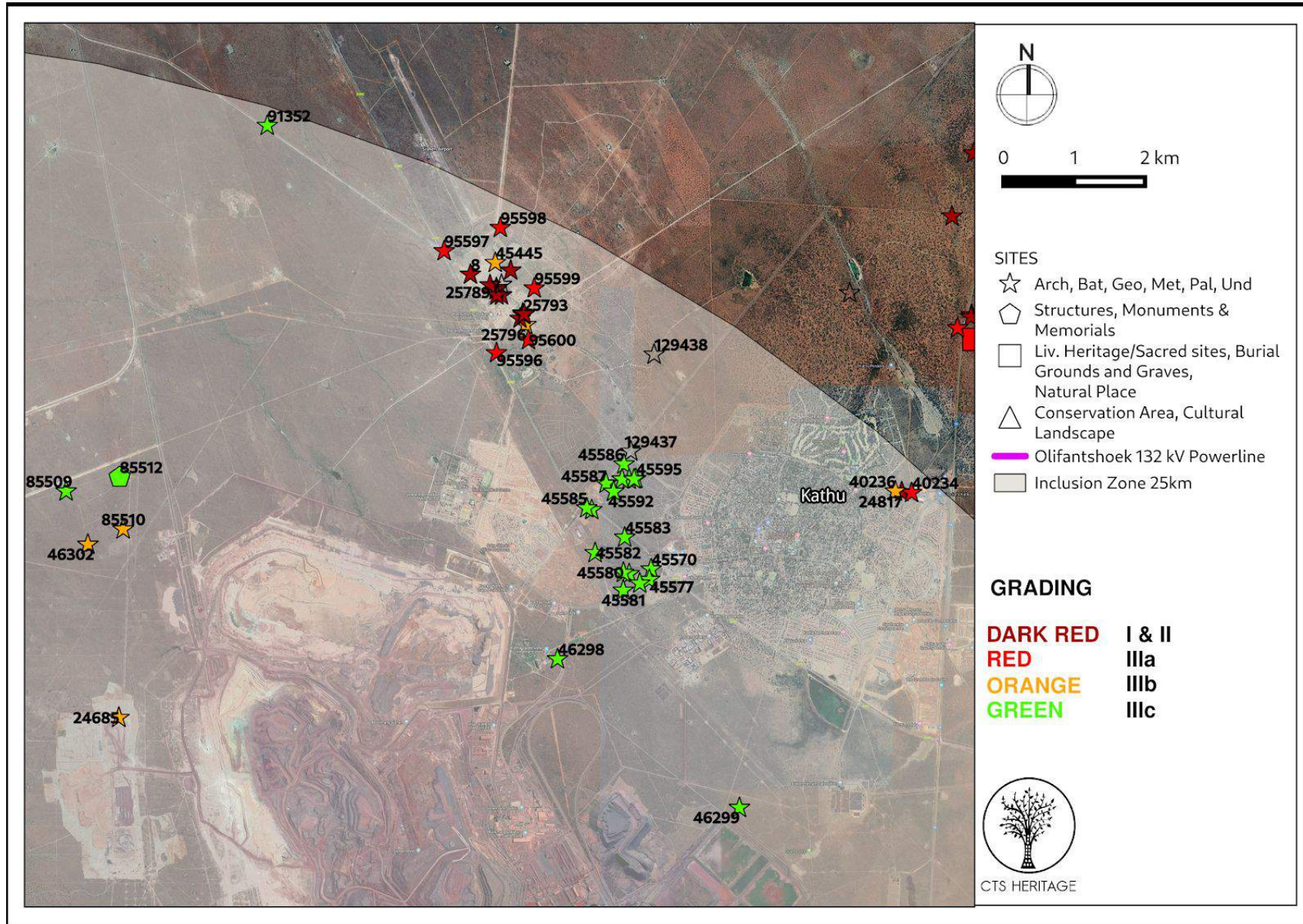


Figure 3a. Heritage Resources Map. Inset

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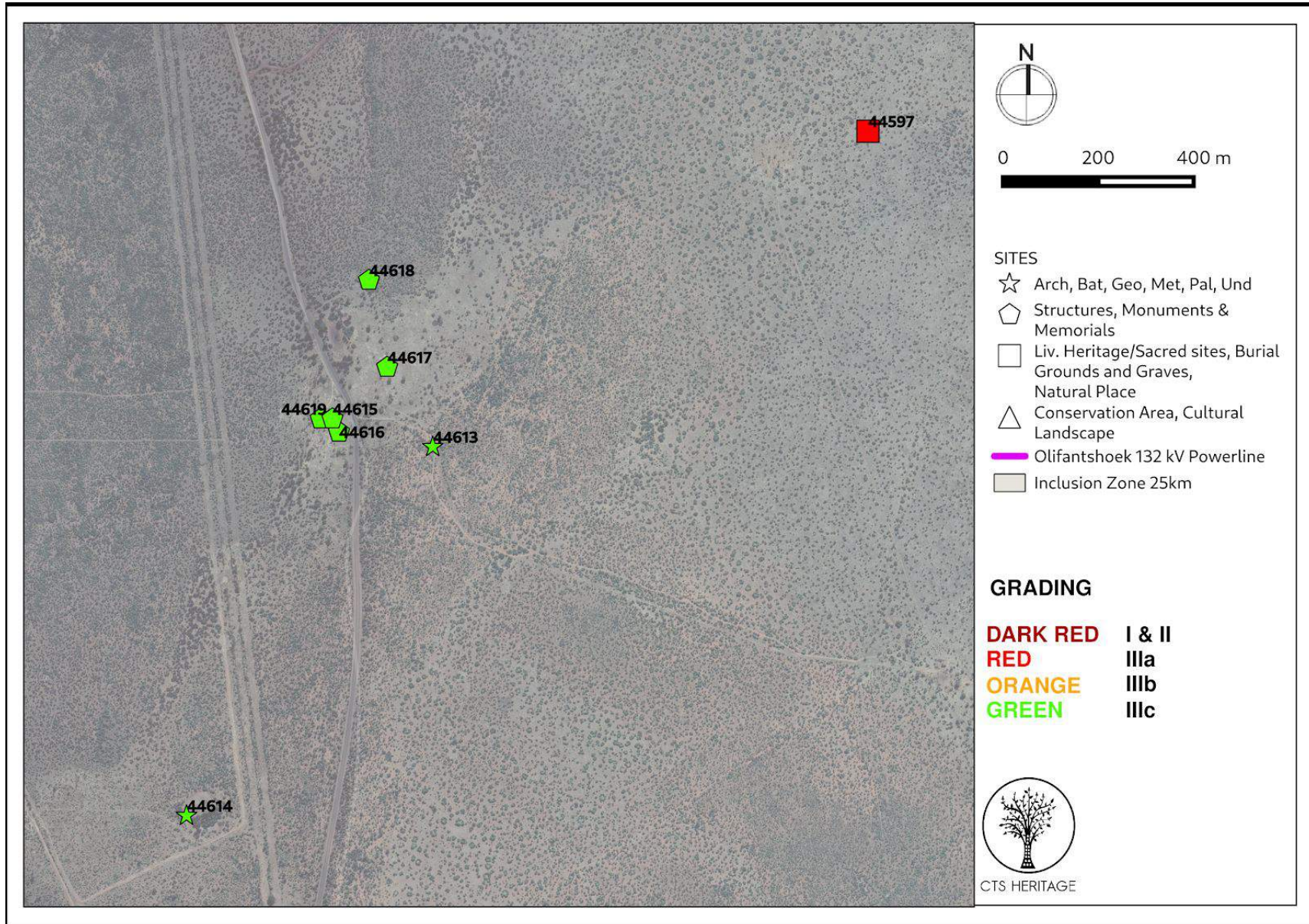


Figure 3b. Heritage Resources Map. Inset

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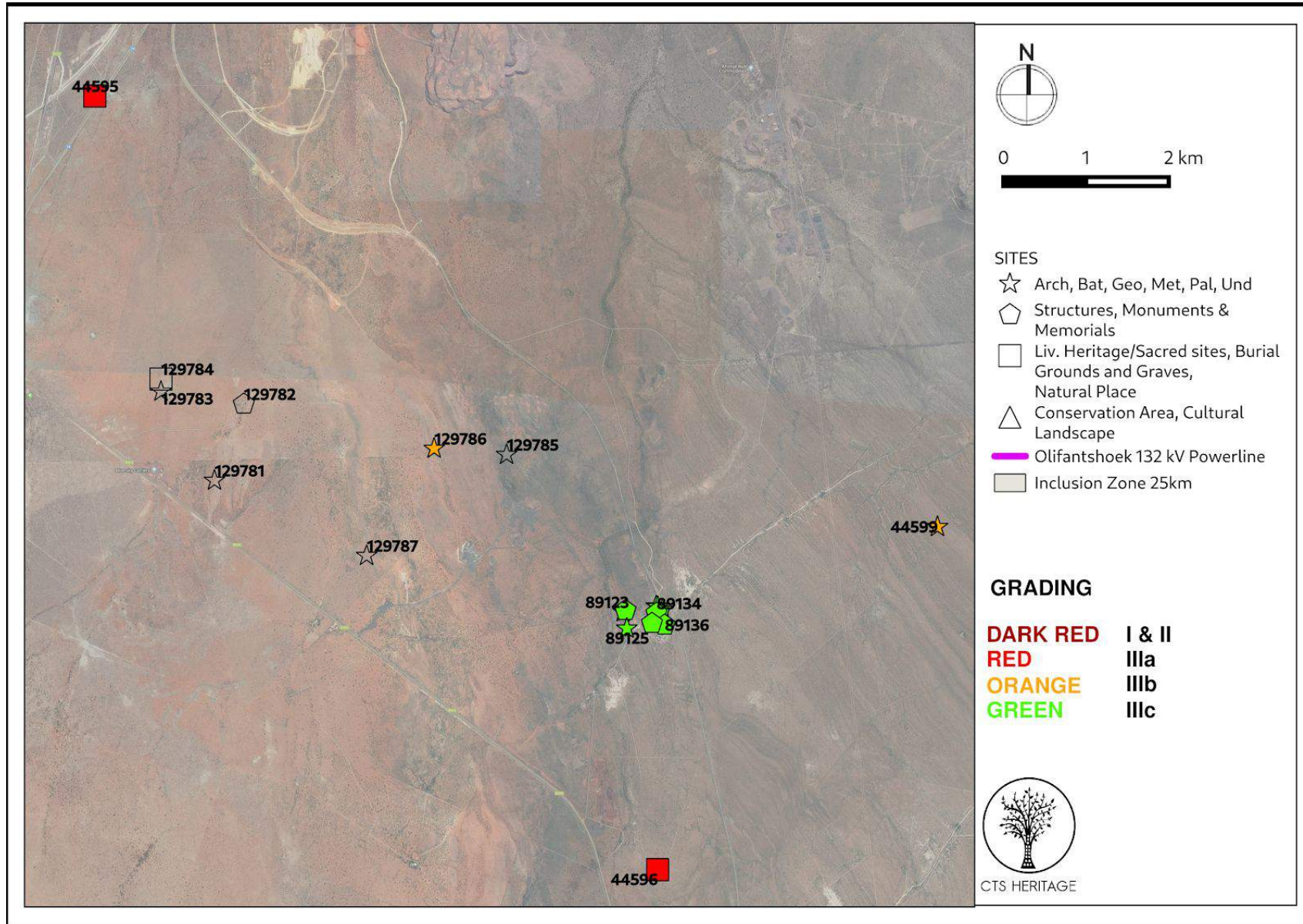


Figure 3c. Heritage Resources Map. Inset

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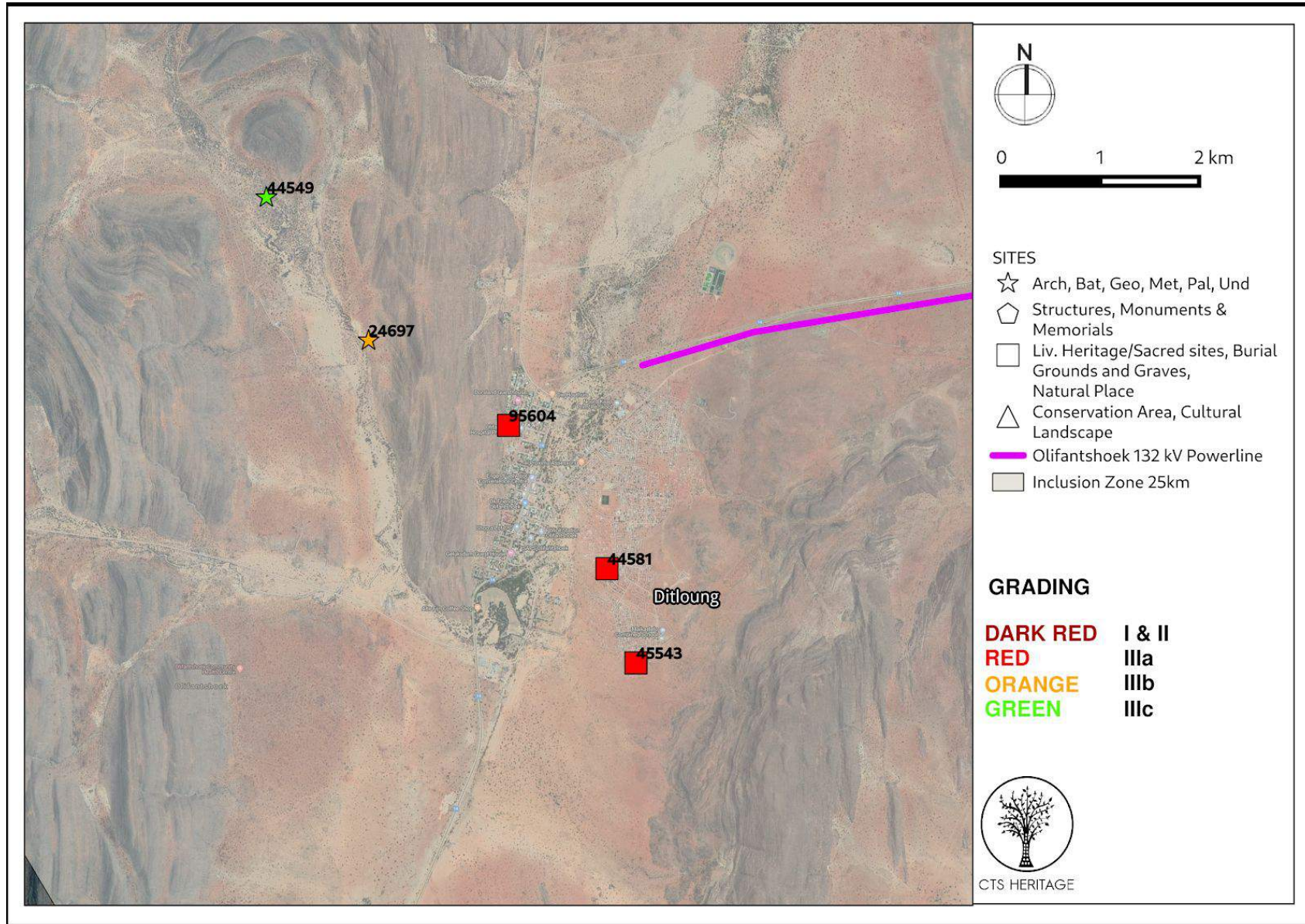


Figure 3d. Heritage Resources Map. Inset

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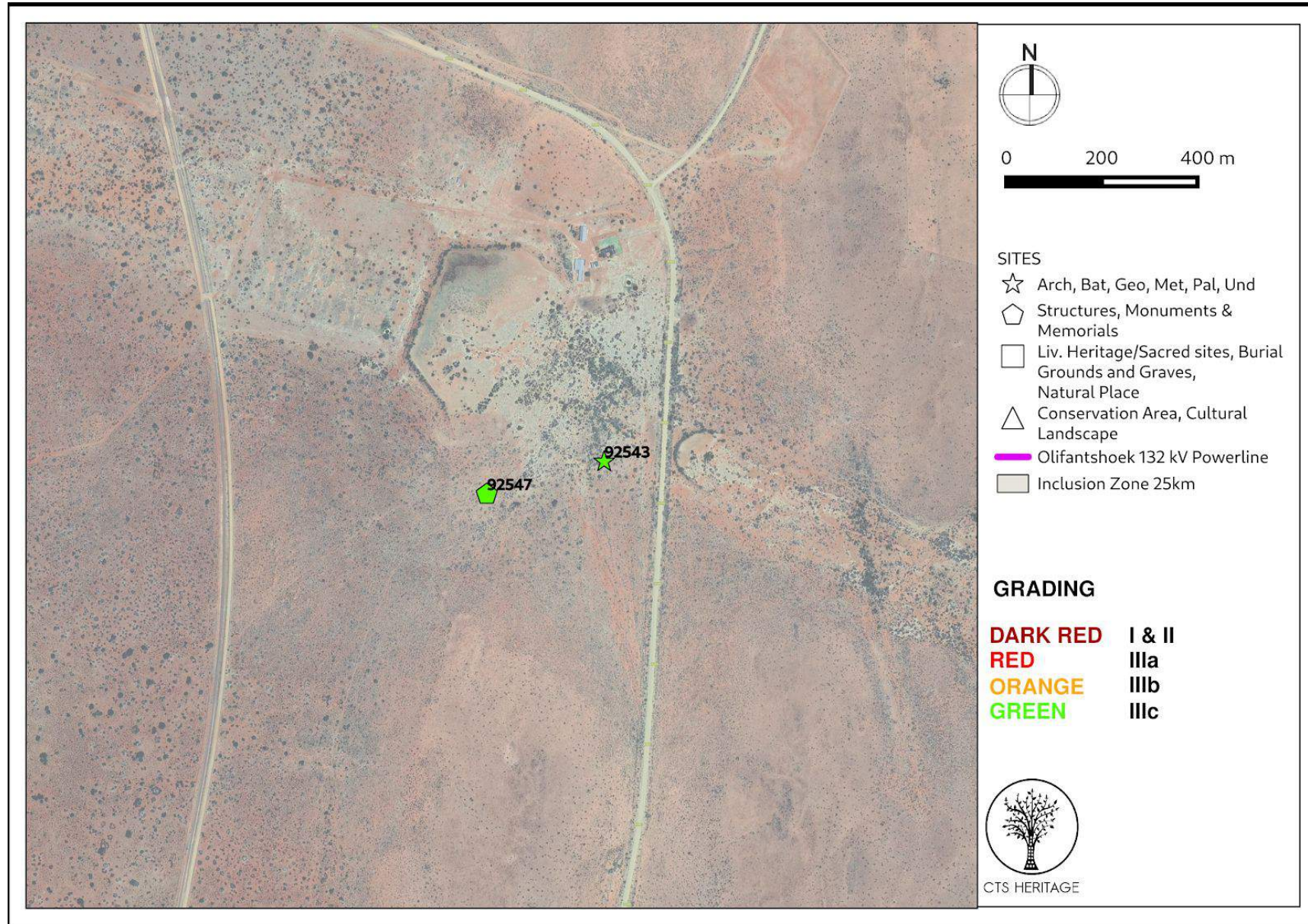


Figure 3e. Heritage Resources Map. Inset

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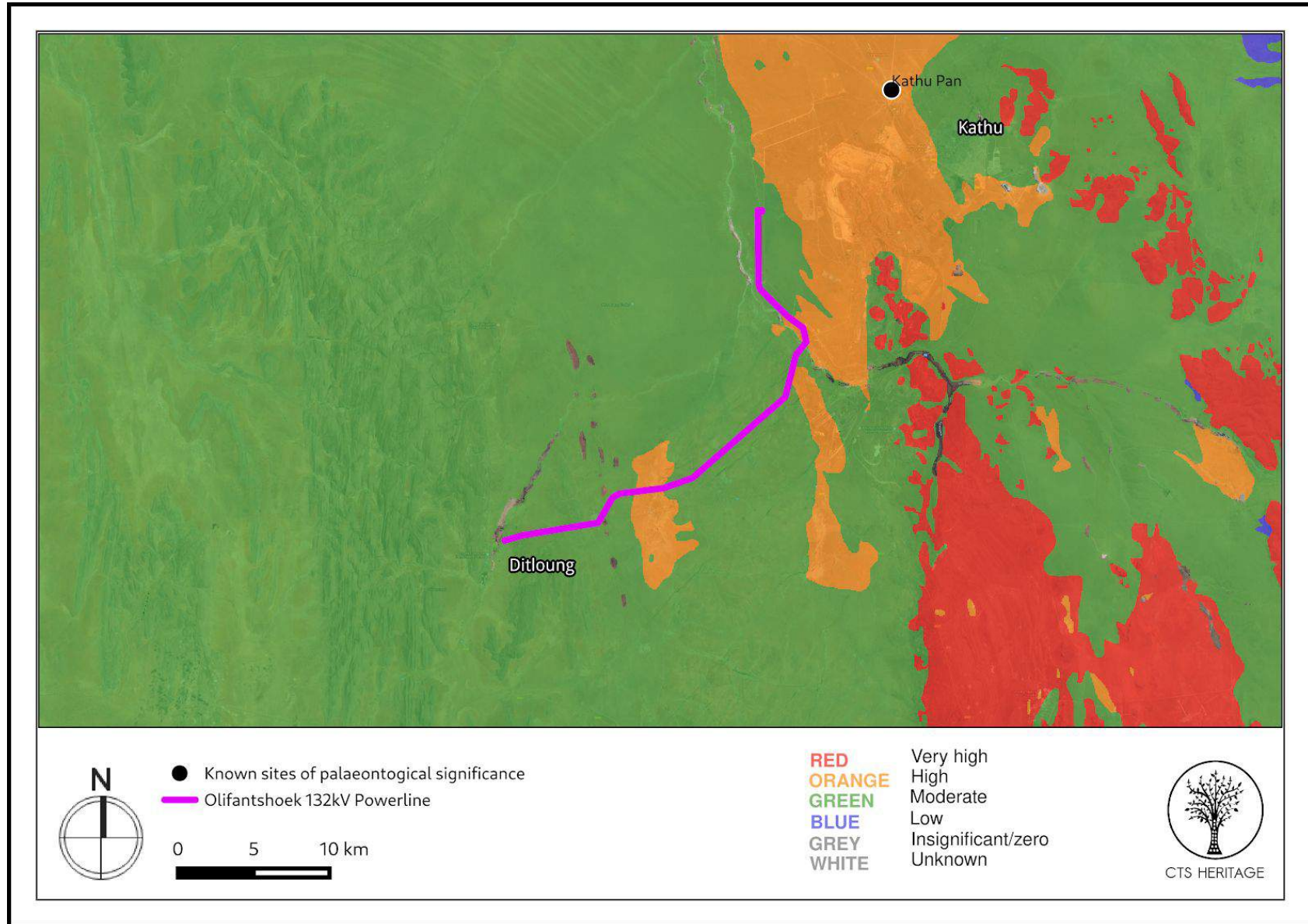


Figure 4. SAHRIS Palaeosensitivity Map. Indicating moderate fossil sensitivity underlying the study area. Please See Appendix 3 for full guide to the legend.

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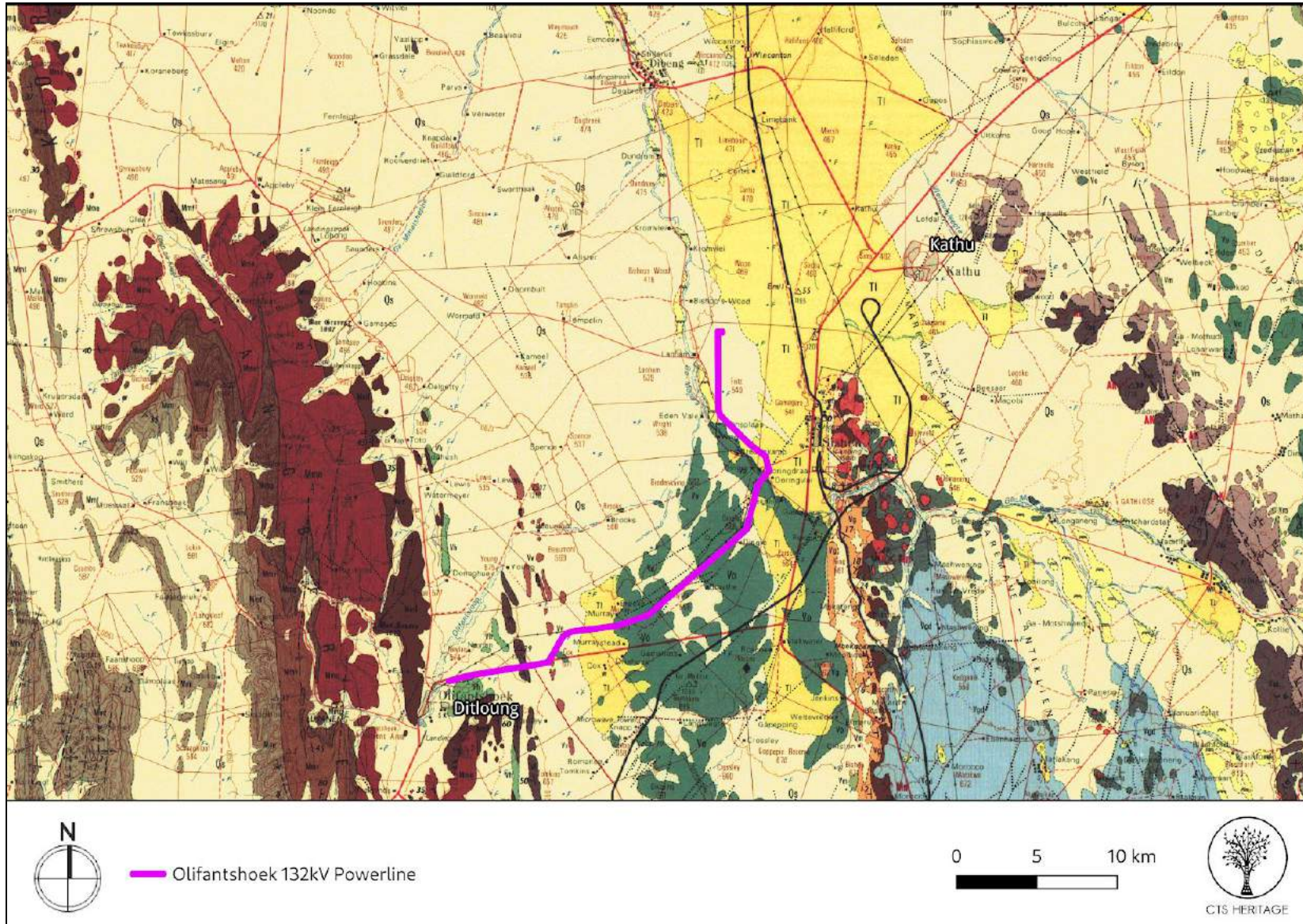


Figure 5a. Geology Map. Indicating the underlying geology across the study area through overlaying the geology maps from the CGS series 2722 Kuruman (Qs: Quarternary Sands; Tl: Tertiary Surface Limestone; Vh: Hartley Formation volcanic rocks; Vl: Lucknow Formation; Vv: Voelwater Formation; Vo: Ongeluk Formation volcanic rocks)

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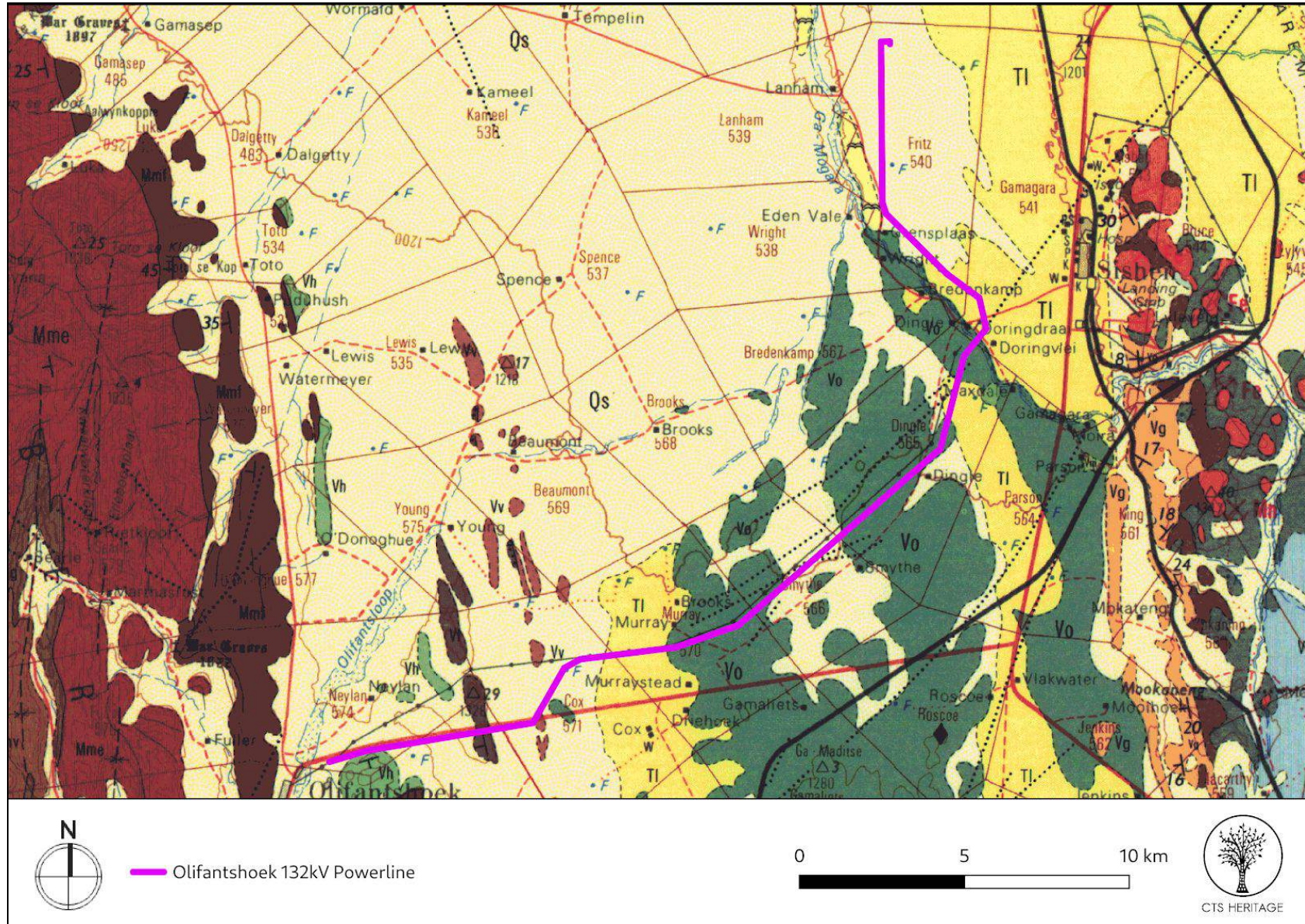


Figure 5b. Geology Map. Zoomed in

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8. Heritage statement and character of the area

This application is for the proposed establishment of a 132kV powerline from the Olifantshoek Substation to the Elim Substation located 13 km west of Kathu. The town of Kathu was established in the 1960's and 1970's as a result of the iron ore mining taking place at the neighbouring Sishen mine. It is important to note that the northern portion of the development lies in close proximity to the Grade I Kathu Pan Archaeological site. At Kathu Pan, north west of the town, evidence of early hominin occupation has been observed at multiple sinkhole sites within the pan, and the results of scientific investigation into these sites has been broadly published. These sites are known for its rich collection of Early Stone Age artefacts, and several Archaeological and Heritage Impact Assessments have recorded the area (see Figure 2 Appendix 2). These archaeological resources occur in areas associated with outcrops of banded ironstone, and the localised natural pan, with most coming specifically from sinkholes in the pan itself.

Gaigher (2014) conducted an assessment for the Solar-Ferrum 400kV Power Line (NID 161472) which runs through part of the proposed 132kV alignment. His report concluded that only ephemeral scatters of Stone Age artefacts of low significance were located in the vicinity of the power line, and he recorded no rock engravings or built environment sites - common site types to be found in this region. The only burial grounds site that Gaigher mentions is the Olifantshoek Cemetery (Site ID 95604), which lies roughly 500m to the west of the southern-most tip of the power line (see Figure 3d), but which will not be impacted. Beaumont's (2007) HIA located a burial ground (Site ID 44581) that he concluded to be from the early 1950's or late 1940's. He located some ephemeral stone age artefacts of low significance which he did not record, but found no archaeological or palaeontological sites of value. In his assessment, Kruger (2012, NID 108970) noted that "a few Middle Stone Age (MSA) artefacts, generally made from fine grained specularite and jaspilite, were recorded at three locations around small water pans in the area. These lithics include only rough core and flake artefacts with smoothed surfaces, and no formal stone tools were observed. However, larger amounts of Earlier and Middle Stone Age artefacts including handaxes, cores and flakes were noted." Due to the proximity of the proposed development to the highly significant Kathu Pan archaeological site, it is likely that the proposed development will negatively impact on archaeological heritage resources.

According to the SAHRA Palaeosensitivity map, the area is underlain by formations of moderate, high and unknown palaeontological significance. However Almond and Pether (2009) describe these specific formations as having a low sensitivity for fossils: both the Hartley and the Lucknow Formations have a low fossil sensitivity, and the sensitivity of the Volwater Formation is unknown. The Gordonia Formation of the Kalahari Group consists of aeolian sands and fossils (bones, teeth, petrified wood, palynomorphs) mainly associated with ancient pans, lakes and river systems, however in a Palaeontological Impact Assessment by Almond (2012, NID 114648), it is stated that "*while a wide spectrum of vertebrate remains, invertebrates, trace fossils, plant fossils and microfossils have been recorded from these Kalahari Group sediments, in general they are of low palaeontological sensitivity and of considerable lateral extent so impacts on fossil heritage here are likely to be of low significance*". Considering these factors, and the fact that no deep excavation is anticipated to occur, it is unlikely that palaeontologically sensitive sediments will be impacted by the proposed development.

RECOMMENDATION:

As it is likely that any proposed development will impact significant heritage resources, it is recommended that a Heritage Impact Assessment be conducted that assesses impacts to archaeological and palaeontological heritage resources.

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APPENDIX 1

List of heritage resources within the 25km Inclusion Zone from SAHRIS

Site ID	Site no	Full Site Name	Site Type	Grading
89124	MAC002	MACARTHY 559/ 002	Structures	Grade IIIc
45590	SIMS15	Sims 462 - 15	Artefacts	Grade IIIc
45591	SIMS16	Sims 462 - 16	Artefacts	Grade IIIc
25667	King Site 3	King Site 3	Ruin > 100 years	Grade IIIb
45592	SIMS17	Sims 462 - 17	Artefacts	Grade IIIc
45595	SIMS20	Sims 462 - 20	Artefacts	Grade IIIc
46298	KAT-SIS07	Kathu-Sishen 07	Artefacts	Grade IIIc
45593	SIMS18	Sims 462 - 18	Artefacts	Grade IIIc
46299	KAT-SIS08	Kathu-Sishen 08	Artefacts	Grade IIIc
91352	DG001	Dingleton 001	Artefacts	Grade IIIc
127290	K 14	66kV network in the Kuruman Site 14	Building	Grade IV
44549	FULL01	Fuller 01	Artefacts	Grade IIIc
44599	POST-KATH05	Postmasburg to Kathu 05	Artefacts	Grade IIIb
44601	POST-KATH07	Postmasburg to Kathu 07	Artefacts	Grade IIIb
44600	POST-KATH06	Postmasburg to Kathu 06	Artefacts	Grade IIIb
40234	BEST001	Bestwood, Kathu 001	Artefacts, Deposit	Grade IIIa
40235	GMGR02	Gamagara 02	Artefacts	Grade IIIb
89125	MAC003	MACARTHY 559/ 003	Artefacts	Grade IIIc
89126	MAC004	MACARTHY 559/ 004	Artefacts	Grade IIIc
89127	MAC005	MACARTHY 559/ 005	Deposit	Grade IIIc
89129	MAC006	MACARTHY 559/ 006	Stone walling	Grade IIIc
89131	MAC007	MACARTHY 559/ 007	Structures	Grade IIIc

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127289	K 13	66kV network in the Kuruman Site 13	Building	Grade IV
89134	MAC008	MACARTHY 559/ 008	Building	Grade IIIc
89136	MAC009	MACARTHY 559/ 009	Structures	Grade IIIc
45580	SIMS05	Sims 462 - 05	Artefacts	Grade IIIc
45581	SIMS06	Sims 462 - 06	Artefacts	Grade IIIc
45582	SIMS07	Sims 462 - 07	Artefacts	Grade IIIc
45583	SIMS08	Sims 462 - 08	Artefacts	Grade IIIc
45584	SIMS09	Sims 462 - 09	Artefacts	Grade IIIc
45585	SIMS10	Sims 462 - 10	Artefacts	Grade IIIc
45578	SIMS03	Sims 462 - 03	Artefacts	Grade IIIc
45586	SIMS11	Sims 462 - 11	Artefacts	Grade IIIc
85512	HEFP004	HIGH ENERGY FUEL PLANT 004	Structures	Grade IIIc
85511	HEFP003	HIGH ENERGY FUEL PLANT 003	Artefacts	Grade IIIc
45543	UPING12	Upington 12	Burial Grounds & Graves	Grade IIIa
44615	MASH03	Mashwening, Kathu 03	Structures	Grade IIIc
29760	Dingleton Resettlement Project	Dingleton	Structures	Grade IIIb
45570	SIMS01	Sims 462 - 01	Artefacts	Grade IIIc
45577	SIMS02	Sims 462 - 02	Artefacts	Grade IIIc
45579	SIMS04	Sims 462 - 04	Artefacts	Grade IIIc
25791	Kathu Pan 6	Kathu Pan 6, Kathu, Northern Cape	Deposit	Grade I
25792	Kathu Pan 7	Kathu Pan 7, Kathu, Northern Cape	Deposit	Grade I
25793	Kathu Pan 8	Kathu Pan 8, Kathu, Northern Cape	Deposit	Grade I
25794	Kathu Pan 9	Kathu Pan 9, Kathu, Northern Cape	Deposit	Grade I
8	Kathu Pan Sites	Kathu Pan Sites 1-11	Archaeological, Deposit	Grade I

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24817	Kathu Townlands	Kathu Townlands 1	Deposit	Grade I
45588	SIMS13	Sims 462 - 13	Artefacts	Grade IIIc
45589	SIMS14	Sims 462 - 14	Artefacts	Grade IIIc
45587	SIMS12	Sims 462 - 12	Artefacts	Grade IIIc
25782	Kathu Pan 1	Kathu Pan 1, Kathu, Northern Cape	Deposit	Grade I
25795	Kathu Pan 10	Kathu Pan 10, Kathu, Northern Cape	Deposit	Grade I
25796	Kathu Pan 11	Kathu Pan 11, Kathu, Northern Cape	Deposit	Grade IIIb
25783	Kathu Pan 2	Kathu Pan 2, Kathu, Northern Cape	Archaeological	Grade I
25787	Kathu Pan 3	Kathu Pan 3, Kathu, Northern Cape	Deposit	Grade I
25789	Kathu Pan 4	Kathu Pan 4, Kathu, Northern Cape	Archaeological	Grade I
25790	Kathu Pan 5	Kathu Pan, Kathu, Northern Cape	Deposit	Grade I
129785	2722DD/Mining/farm Jenkins 562/Site JNK5	Farm Jenkins 562, Kathu, Tsantsabane Local Municipality, Northern Cape Province	Archaeological	Grade IV
129786	2722DD/Mining/farm Jenkins 562/Site JNK6	Farm Jenkins 562, Kathu, Tsantsabane Local Municipality, Northern Cape Province	Archaeological	Grade IIIb
129787	2722DD/Mining/farm Jenkins 562/Site JNK7	Farm Jenkins 562, Kathu, Tsantsabane Local Municipality, Northern Cape Province	Archaeological	Grade IV
129437	Kathu Extensions 6-10		Archaeological	
129438	Kathu Extension 6-10	Site 5 Stone Age	Archaeological	
129732	2723AD/Electrical infrastructure/Kuruman/site K13	Kuruman area, Northern Cape Province	Structures	Grade IV
129733	2723AD/Electrical infrastructure/Kuruman/site K14	Kuruman area, Northern Cape Province	Structures	Grade IV
129781	2722DD/Mining/farm Jenkins 562/Site JNK1	Farm Jenkins 562, Kathu, Tsantsabane Local Municipality, Northern Cape Province	Artefacts	Grade IV

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129782	2722DD/Mining/farm Jenkins 562/Site JNK2	Farm Jenkins 562, Kathu, Tsantsabane Local Municipality, Northern Cape Province	Structures	Ungraded
129783	2722DD/Mining/farm Jenkins 562/Site JNK3	Farm Jenkins 562, Kathu, Tsantsabane Local Municipality, Northern Cape Province	Archaeological	Grade IV
129784	2722DD/Mining/farm Jenkins 562/Site JNK4	Farm Jenkins 562, Kathu, Tsantsabane Local Municipality, Northern Cape Province	Burial Grounds & Graves	Grade IV
44614	MASH02	Mashwening, Kathu 02	Archaeological	Grade IIIc
44619	MASH07	Mashwening, Kathu 07	Structures	Grade IIIc
44616	MASH04	Mashwening, Kathu 04	Structures	Grade IIIc
44617	MASH05	Mashwening, Kathu 05	Structures	Grade IIIc
44618	MASH06	Mashwening, Kathu 06	Structures	Grade IIIc
89138	MAC010	MACARTHY 559/ 010	Structures	Grade IIIc
85509	HEFP001	HIGH ENERGY FUEL PLANT 001	Artefacts	Grade IIIc
95596	Vaal-Gamagara 01	Vaal-Gamagara 01	Palaeontological	Grade IIIa
40236	UKM001	Uitkoms, Kathu 001	Artefacts	Grade IIIb
45445	DELP01	Delportshoop 01	Archaeological	Grade IIIb
44581	SKERP-DIEP 01	Skerpdraai-Diepkloof 01	Burial Grounds & Graves	Grade IIIa
44596	POST-KATH02	Postmasburg to Kathu 02	Burial Grounds & Graves	Grade IIIa
44597	POST-KATH03	Postmasburg to Kathu 03	Burial Grounds & Graves	Grade IIIa
44598	POST-KATH04	Postmasburg to Kathu 04	Burial Grounds & Graves	Grade IIIa
44595	POST-KATH01	Postmasburg to Kathu 01	Burial Grounds & Graves	Grade IIIa
44613	MASH01	Mashwening, Kathu 01	Archaeological	Grade IIIc
92543	SISH02	sishen-saldanha 002	Artefacts	Grade IIIc
92547	SISH06	sishen-saldanha 006	Building	Grade IIIc
127543	EXIGO-LHE-SA01	Exigo Lyleveld Haul road Extension Stone Age 01	Artefacts	Ungraded
127544	EXIGO-LHE-SA02	Exigo Lyleveld Haul road Extension Stone Age 02	Artefacts	Ungraded

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108046	KC1	New Kathu Cemetery - Findspot KC1	Deposit	
108208	Lohatla673_Cemetery 01x	Disturbed graveyard at Kitso mine	Burial Grounds & Graves	
102663	Kathu Pan	Kathu Pan Sites	Archaeological	
129436	Kathu Extensions 6-10	Site 2 Stone Age	Archaeological	
85510	HEFP002	HIGH ENERGY FUEL PLANT 002	Artefacts	Grade IIIc
95598	Vaal-Gamagara 03	Vaal-Gamagara 03	Palaeontological	Grade IIIa
95599	Vaal-Gamagara 04	Vaal-Gamagara 04	Palaeontological	Grade IIIa
95600	Vaal-Gamagara 05	Vaal-Gamagara 05	Palaeontological	Grade IIIa
95597	Vaal-Gamagara 02	Vaal-Gamagara 02	Palaeontological	Grade IIIa
95604	OFHC	Olifantshoek Cemetery	Burial Grounds & Graves	Grade IIIa
127557	LDS-SAK12	Low Density Scatter Stone Age K12	Artefacts	
127591	Kitso Mine Old Burial Ground	Kitso Mine Old Burial Ground	Burial Grounds & Graves	
46301	KAT-SIS10	Kathu-Sishen 10	Artefacts	Grade IIIb
46302	KAT-SIS11	Kathu-Sishen 11	Artefacts	Grade IIIb
45594	SIMS19	Sims 462 - 19	Artefacts	Grade IIIc
46300	KAT-SIS09	Kathu-Sishen 09	Artefacts	Grade IIIb
24685	SA02 Woon 469	SA02 on Woon 469	Artefacts	Grade IIIb
24697	Site A, Farm Fuller 578, Olifantshoek	Site A, Farm Fuller 578, Olifantshoek	Archaeological	Grade IIIb
89123	MAC001	MACARTHY 559/ 001	Artefacts	Grade IIIc

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APPENDIX 2 Reference List

Heritage Impact Assessments				
Nid	Report Type	Author/s	Date	Title
4116	AIA	Peter Beaumont	06/02/2008	Phase 1 Heritage Impact Assessment Report on a Portion of the Remainder of the Farm Sekgame 461, Kathu, Gamagara Municipality, Northern Cape Province
4117	AIA	Peter Beaumont	07/02/2008	Phase 1 Heritage Impact Assessment Report on Portion 463/8 of the Farm Uitkoms 463, near Kathu, Kgalagadi Municipality, Northern Cape Province
4372	AIA	David Morris	01/02/2005	Report on a Phase 1 Archaeological Assessment of Proposed Mining Areas of the Farms Bruce, King, Mokaning and Parson, Between Postmasburg and Kathu, Northern Cape
4376	AIA	Peter Beaumont	30/04/2006	Phase 1 Heritage Impact Assessment Report on Erf 1439, Remainder of Erf 2974 and Remainder of Portion 1 of the Farm Uitkoms No 463, and Farms Kathu 465 and Sims 462 at and near Kathu in the Northern Cape Province
4378	AIA	Peter Beaumont	30/05/2006	Phase 1 Heritage Impact Assessment Report on Portion 5 of the Farm Uitkoms 463, Kgalagadi District, Northern Cape Province
4379	AIA	Peter Beaumont	31/05/2006	Phase 1 Heritage Impact Assessment Report on Portions A and B of the Farm Sims 462, Kgalagadi District, Northern Cape Province
4387	AIA	Peter Beaumont	12/06/2008	Phase 1 Archaeological Impact Assessment Report on Portion 459/49 of the Farm Bestwood 459 at Kathu, Kgalagadi District Municipality, Northern Cape Province
4391	AIA	Cobus Dreyer	11/08/2008	First Phase Archaeological and Cultural Heritage Assessment of the Proposed Residential Developments at a Portion of the Remainder of the Farm Bestwood 459 Rd, Kathu, Northern Cape
4596	AIA	Peter Beaumont	01/05/2004	Heritage EIA of Two Areas at Sishen Iron Ore Mine
4597	AIA	Peter Beaumont	01/10/2005	Heritage Impact Assessment of an Area of the Sishen Iron Ore Mine that may be Covered by the Vliegveldt Waste Dump
4598	HIA	Peter Beaumont	15/10/2005	Heritage Impact Assessment for EMPR Amendment for Crusher at Sishen Iron Ore Mine
4600	AIA	Peter Beaumont	24/05/2007	Phase 1 Heritage Impact Assessment Report on a 15 Ha Portion of the Allotment Area That Borders on the Skerpdraai and Diepkloof Townships at Olifantshoek, Gamagara Municipality, Northern Cape Province
4603	AIA	David Morris	01/09/2008	Archaeological and Heritage Phase 1 Impact Assessment for Proposed Upgrading of Sishen Mine Diesel Depot

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Storage Capacity at Kathu, Northern Cape				
4605	AIA	Peter Beaumont	03/04/2007	Phase 1 Heritage Impact Assessment Report on a Portion of the Farm Fuller 578 near Olifantshoek, Siyanda District Municipality, Northern Cape Province
6355	AIA	Cobus Dreyer	10/12/2008	First Phase Archaeological and Cultural Heritage Assessment of the Proposed Bourke Project, Ballast Site and Crushing Plant at Bruce Mine, Dingleton, near Kathu, Northern Cape
6639	AIA	Jonathan Kaplan	01/09/2008	Phase 1 Archaeological Impact Assessment: Proposed Housing Development, Erf 5168, Kathu, Northern Cape Province
6804	AIA	Peter Beaumont	01/04/2000	Archaeological Impact Assessment: Archaeological Scoping Survey for the Purpose of an EMPR for the Sishen Iron Ore Mine
7413	AIA	David Morris	23/08/2001	Report on Assessment of Archaeological Resources in the Vicinity of Proposed Mining at Morokwa
8086	AIA	Johan Nel	14/11/2008	Final Report Heritage Resources Scoping Survey & Preliminary Assessment Transnet Freight Line EIA, Eastern Cape and Northern Cape
92575	HIA	Elize Becker	10/10/2012	Phase 1 Heritage Impact Assessment Kimberley to De Aar
108346	AIA	Christine Vivier	12/11/2009	Phase 1 archaeological impact assessment report on a portion of the farm Lylyveld 545 near Kathu, Kagalagadi District Municipality, Northern Cape province.
108351		Neels Kruger	01/04/2012	Archaeological impact assessment (AIA) of demarcated surface areas on the farms Fritz 540, Gamagara 541, Sishen 543 and Parsons 564, Sishen Iron Ore Mine Complex, Kgalagadi District Municipality, Northern Cape province.
108970	AIA	Nelius Kruger	01/09/2012	ARCHAEOLOGICAL IMPACT ASSESSMENT (AIA) OF DERMACAED SURFACE AREAS ON THE FARMS GAMAGARA 541, ONVERWACHT 540 (FRITZ 540 PORTION 1) AND NOOITGEDACHT 469 (WOON 469), SISHEN IRON ORE MINE, KGALAGADI DISTRICT MUNICIPALITY, NORTHERN CAPE PROVINCE.
114648	PIA	John E Almond	01/09/2012	Palaeontological specialist assessment: desktop study PROPOSED 16 MTPA EXPANSION OF TRANSNET'S EXISTING MANGANESE ORE EXPORT RAILWAY LINE & ASSOCIATED INFRASTRUCTURE BETWEEN HOTAZEL AND THE PORT OF NGQURA, NORTHERN & EASTERN CAPE. Part 1: Hotazel
121132	HIA	Peter Beaumont	26/11/2011	Baseline Archaeological Reconnaissance Report on the Farm Lomoteng 669, North of Postmasburg in the Siyanda District Municipality of the Northern Cape Province
123045	AIA	Cobus Dreyer	26/06/2013	Report Eskom Garona Ferrum Mercury
123399	AIA	Peter Beaumont	15/05/2013	PHASE 2 ARCHAEOLOGICAL PERMIT MITIGATION REPORT ON A ~0.7 HA PORTION OF THE FARM

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				BESTWOOD 549, SITUATED ON THE EASTERN OUTSKIRTS OF KATHU, JOHN TAOLO GAETSEWE DISTRICT MUNICIPALITY, NORTHERN CAPE PROVINCE.
129366	HIA	Cobus Dreyer	28/08/2013	First Phase Archaeological & Heritage Assessment of the Proposed Garona-Ferrum Transmission Line, Northern Cape
129751	HIA	Elize Becker	20/02/2013	Phase 1 Heritage Impact Assessment Hotazel to Kimberley and De Aar to Port of Ngqura
145005	AIA	Munyadziwa Magoma	01/07/2013	Phase 1 Archaeological Impact Assessment specialist study report for the proposed development of prospecting rights of iron ore and manganese on remaining extent of Mashwening 557 in Khathu, within the Local Municipality of Gamagara, John Taolo Gaetsewe
151768	PIA	John E Almond	01/11/2013	Palaeontological specialist assessment: combined desktop and field-based study: PROPOSED 16 MTPA EXPANSION OF TRANSNET'S EXISTING MANGANESE ORE EXPORT RAILWAY LINE & ASSOCIATED INFRASTRUCTURE BETWEEN HOTAZEL AND THE PORT OF NGQURA, NORTHERN & EAS
152157	HIA	Johnny Van Schalkwyk	15/05/2012	Heritage impact assessment for the proposed estate development on the farm Kalahari Golf and Jag Landgoed 775, KATHU, NORTHERN CAPE PROVINCE
152170	HIA	Robert de Jong	03/09/2008	HERITAGE IMPACT ASSESSMENT REPORT: PROPOSED RESIDENTIAL DEVELOPMENT AND ASSOCIATED INFRASTRUCTURE ON A 200 HA PORTION OF THE FARM BESTWOOD 429 RD AT KATHU, NORTHERN CAPE PROVINCE
152171	AIA	Cobus Dreyer	11/08/2008	FIRST PHASE ARCHAEOLOGICAL AND CULTURAL HERITAGE ASSESSMENT OF THE PROPOSED RESIDENTIAL DEVELOPMENTS AT A PORTION OF THE REMAINDER OF THE FARM BESTWOOD 459RD, KATHU, NORTHERN CAPE
156617	AIA	David Morris	01/02/2014	Rectification and/or regularisation of activities relating to the Bestwood Township development near Kathu, Northern Cape: Phase 1 Archaeological Impact Assessment
161427	HIA	Stephan Gaigher	15/04/2014	Proposed Establishment of Several Electricity Distribution Lines within the Northern Cape Province
163959	HIA	Anton van Vollenhoven	17/03/2014	HIA Eskom Manganore to Ferrum Scoping Phase
167779	HIA	Jonathan Kaplan	30/06/2014	HERITAGE IMPACT ASSESSMENT PROPOSED MIXED USE DEVELOPMENT IN KATHU, NORTHERN CAPE PROVINCE Remainder & Portion 1 of the Farm Sims 462, Kuruman RD

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170455	AIA	Neels Kruger	31/03/2014	ARCHAEOLOGICAL IMPACT ASSESSMENT (AIA) OF DEMARCATED SURFACE PORTIONS ON THE FARMS SACHA 468, SIMS 462 AND SEKGAME 461 FOR THE PROPOSED STORMWATER INFRASTRUCTURE (CLEAN WATER CUT-OFF BERM & GROUNDWATER DAM) FOR THE SISHEN MINE, KATHU, NORTHERN CAPE PROVINCE
170460	AIA	Neels Kruger	31/01/2014	ARCHAEOLOGICAL IMPACT ASSESSMENT (AIA) OF DEMARCATED SURFACE PORTIONS ON THE FARMS SACHA 468 AND WOON 469 FOR THE PROPOSED HIGH ENERGY FUEL PLANT AND RAILWAY SIDING, SISHEN IRON ORE MINE, JOHN TAOLO GAETSEWE DISTRICT MUNICIPALITY, NORTHERN CAPE PROVINCE
170660	AIA	Cobus Dreyer	31/01/2014	FIRST PHASE ARCHAEOLOGICAL & HERITAGE ASSESSMENT OF THE PROPOSED VAAL-GAMAGARA WATER PIPELINE PROJECT, NORTHERN CAPE: HOTAZEL ALTERNATIVE WATER PIPELINE
170664	AIA	Cobus Dreyer	28/09/2012	FIRST PHASE ARCHAEOLOGICAL AND HERITAGE ASSESSMENT OF THE PROPOSED VAAL-GAMAGARA WATER PIPELINE PROJECT, NORTHERN CAPE
170666	AIA	Cobus Dreyer	31/12/2013	FIRST PHASE ARCHAEOLOGICAL & HERITAGE ASSESSMENT OF THE VAAL-GAMAGARA WATER PIPELINE PROJECT, NORTHERN CAPE: REVISIT TO THE KATHU PAN ARCHAEOLOGICAL SITE
174359	AIA	Neels Kruger	25/08/2014	ARCHAEOLOGICAL IMPACT ASSESSMENT (AIA) OF DEMARCATED SURFACE PORTIONS ON THE FARMS SACHA 468 AND WOON 469 FOR THE PROPOSED HIGH ENERGY FUEL PLANT AND RAILWAY SIDING, SISHEN IRON ORE MINE, JOHN TAOLO GAETSEWE DISTRICT MUNICIPALITY, NORTHERN CAPE PROVINCE
177105	HIA	Cobus Dreyer	10/05/2014	FIRST PHASE ARCHAEOLOGICAL & HERITAGE INVESTIGATION OF THE PROPOSED MINE PROSPECTING AT THE REMAINING EXTENT OF THE FARM INGLESBY 580 NEAR OLIFANTSHOEK, NORTHERN CAPE PROVINCE
251178	AIA	Peter Beaumont		Baseline Archaeological Reconnaissance Report on the Farm Lomoteng 669, North of Postmasburg in the Siyanda District Municipality of the Northern Cape Province
251329	AIA	Jayson Orton	20/02/2015	Heritage Impact Assessment for a Proposed 132 kV Power Line, Kuruman Magisterail District, Northern Cape
252975	HIA	Marko Hutten, Polke Birkholtz	18/07/2014	Heritage Impact Assessment for the Proposed Kathu Supplier Park on parts of the Remainder and on Portion 9 of the Farm Sekgame 461 on the southern side of the town of Kathu in the Gamagara Local Municipality, Northern Cape.
273602	HIA	Polke Birkholtz	20/04/2015	Heritage Impact Assessment for the Proposed Establishment of a Grazing Project on a Portion of the Farm Marsh 467, Dingleton, Gamagara Local Municipality, Northern Cape.
279906	AIA	Neels Kruger	02/12/2014	ARCHAEOLOGICAL IMPACT ASSESSMENT (AIA) OF DEMARCATED SURFACE PORTIONS ON THE FARM SEKGAME 461 FOR THE PROPOSED SEKGAME ELECTRICITY INFRASTRUCTURE EXPANSION PROJECT,

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				SISHEN MINE, NORTHERN CAPE PROVINCE
294454	AIA	Neels Kruger	05/04/2015	ARCHAEOLOGICAL IMPACT ASSESSMENT (AIA) OF AREAS DEMARCTED FOR THE PROPOSED LYLEVELD NORTH WASTE ROCK DUMP EXPANSION AND LYLEVELD SOUTH HAUL ROAD EXTENSION PROJECT, SISHEN MINE, NORTHERN CAPE PROVINCE

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APPENDIX 3 - Keys/Guides

Key/Guide to Acronyms

AIA	Archaeological Impact Assessment
DARD	Department of Agriculture and Rural Development (KwaZulu-Natal)
DEA	Department of Environmental Affairs (National)
DEADP	Department of Environmental Affairs and Development Planning (Western Cape)
DEDEAT	Department of Economic Development, Environmental Affairs and Tourism (Eastern Cape)
DEDECT	Department of Economic Development, Environment, Conservation and Tourism (North West)
DEDT	Department of Economic Development and Tourism (Mpumalanga)
DEDTEA	Department of economic Development, Tourism and Environmental Affairs (Free State)
DENC	Department of Environment and Nature Conservation (Northern Cape)
DMR	Department of Mineral Resources (National)
GDARD	Gauteng Department of Agriculture and Rural Development (Gauteng)
HIA	Heritage Impact Assessment
LEDET	Department of Economic Development, Environment and Tourism (Limpopo)
MPRDA	Mineral and Petroleum Resources Development Act, no 28 of 2002
NEMA	National Environmental Management Act, no 107 of 1998
NHRA	National Heritage Resources Act, no 25 of 1999
PIA	Palaeontological Impact Assessment
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
VIA	Visual Impact Assessment

Full guide to Palaeosensitivity Map legend

	RED:	VERY HIGH - field assessment and protocol for finds is required
	ORANGE/YELLOW:	HIGH - desktop study is required and based on the outcome of the desktop study, a field assessment is likely
	GREEN:	MODERATE - desktop study is required
	BLUE/PURPLE:	LOW - no palaeontological studies are required however a protocol for chance finds is required
	GREY:	INSIGNIFICANT/ZERO - no palaeontological studies are required
	WHITE/CLEAR:	UNKNOWN - these areas will require a minimum of a desktop study.

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APPENDIX 4 - Methodology

The Heritage Screener summarises the heritage impact assessments and studies previously undertaken within the area of the proposed development and its surroundings. Heritage resources identified in these reports are assessed by our team during the screening process.

The heritage resources will be described both in terms of **type**:

- Group 1: Archaeological, Underwater, Palaeontological and Geological sites, Meteorites, and Battlefields
- Group 2: Structures, Monuments and Memorials
- Group 3: Burial Grounds and Graves, Living Heritage, Sacred and Natural sites
- Group 4: Cultural Landscapes, Conservation Areas and Scenic routes

and **significance** (Grade I, II, IIIa, b or c, ungraded), as determined by the author of the original heritage impact assessment report or by formal grading and/or protection by the heritage authorities.

Sites identified and mapped during research projects will also be considered.

DETERMINATION OF THE EXTENT OF THE INCLUSION ZONE TO BE TAKEN INTO CONSIDERATION

The extent of the inclusion zone to be considered for the Heritage Screener will be determined by CTS based on:

- the size of the development,
- the number and outcome of previous surveys existing in the area
- the potential cumulative impact of the application.

The inclusion zone will be considered as the region within a maximum distance of 50 km from the boundary of the proposed development.

DETERMINATION OF THE PALAEOONTOLOGICAL SENSITIVITY

The possible impact of the proposed development on palaeontological resources is gauged by:

- reviewing the fossil sensitivity maps available on the South African Heritage Resources Information System (SAHRIS)
- considering the nature of the proposed development
- when available, taking information provided by the applicant related to the geological background of the area into account

DETERMINATION OF THE COVERAGE RATING ASCRIBED TO A REPORT POLYGON

Each report assessed for the compilation of the Heritage Screener is colour-coded according to the level of coverage accomplished. The extent of the surveyed coverage is labeled in three categories, namely low, medium and high. In most instances the extent of the map corresponds to the extent of the development for which the specific report was undertaken.

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Low coverage will be used for:

- desktop studies where no field assessment of the area was undertaken;
- reports where the sites are listed and described but no GPS coordinates were provided.
- older reports with GPS coordinates with low accuracy ratings;
- reports where the entire property was mapped, but only a small/limited area was surveyed.
- uploads on the National Inventory which are not properly mapped.

Medium coverage will be used for

- reports for which a field survey was undertaken but the area was not extensively covered. This may apply to instances where some impediments did not allow for full coverage such as thick vegetation, etc.
- reports for which the entire property was mapped, but only a specific area was surveyed thoroughly. This is differentiated from low ratings listed above when these surveys cover up to around 50% of the property.

High coverage will be used for

- reports where the area highlighted in the map was extensively surveyed as shown by the GPS track coordinates. This category will also apply to permit reports.

RECOMMENDATION GUIDE

The Heritage Screener includes a set of recommendations to the applicant based on whether an impact on heritage resources is anticipated. One of three possible recommendations is formulated:

(1) The heritage resources in the area proposed for development are sufficiently recorded - The surveys undertaken in the area adequately captured the heritage resources. There are no known sites which require mitigation or management plans. No further heritage work is recommended for the proposed development.

This recommendation is made when:

- enough work has been undertaken in the area
- it is the professional opinion of CTS that the area has already been assessed adequately from a heritage perspective for the type of development proposed

(2) The heritage resources and the area proposed for development are only partially recorded - The surveys undertaken in the area have not adequately captured the heritage resources and/or there are sites which require mitigation or management plans. Further specific heritage work is recommended for the proposed development.

This recommendation is made in instances in which there are already some studies undertaken in the area and/or in the adjacent area for the proposed development. Further studies in a limited HIA may include:

- improvement on some components of the heritage assessments already undertaken, for instance with a renewed field survey and/or with a specific specialist for the type of heritage resources expected in the area
- compilation of a report for a component of a heritage impact assessment not already undertaken in the area

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- undertaking mitigation measures requested in previous assessments/records of decision.

(3) The heritage resources within the area proposed for the development have not been adequately surveyed yet - Few or no surveys have been undertaken in the area proposed for development. A full Heritage Impact Assessment with a detailed field component is recommended for the proposed development.

Note:

The responsibility for generating a response detailing the requirements for the development lies with the heritage authority. However, since the methodology utilised for the compilation of the Heritage Screeners is thorough and consistent, contradictory outcomes to the recommendations made by CTS should rarely occur. Should a discrepancy arise, CTS will immediately take up the matter with the heritage authority to clarify the dispute.

The compilation of the Heritage Screener will not include any field assessment. The Heritage Screener will be submitted to the applicant within 24 hours from receipt of full payment. **If the 24-hour deadline is not met by CTS, the applicant will be refunded in full.**

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